

## RECRUITMENT SPECIAL

**Psst . . . heard about any good jobs lately?**

FOR anyone contemplating switching computer systems and equipment, Compac is the acknowledged marketplace. Whether it's upgrade, regrade or even first grade, Olympia caters for all comers.

Compac, however, does not solely display computer products, services and future technological trends. It also serves as a general meeting place, with reunions and casual encounters being recognised features of the fun of the fair.

Additionally, Compac features many close encounters of the recruitment kind whether by design or chance. In the role of international job exchange and forum, Compac has few equals.

Keeping in touch is very much the name of the promotion stakes, whether you are a senior sales or DP manager or a potential entrant to the computer industry.

Major exhibitions and conferences offer several levels of job activity such as an in-house promotional lever; informing your boss, for example, that a friendly data processing manager was making

interesting job suggestions which are hard to resist. Unless a rate can be negotiated, the away day procedure will be triggered.

The DPM himself can make use of Compac for conducting some basic research into trends of pay perks and benefits. In fact his visit to Compac could well be sponsored by the installation team for this most self motivated purpose.

Not only do stands reveal the exhibitors' products and services, but also the general marketing approach of the organisation.

The hard selling company which has deliberately placed salesmen in the aisles in order to waylay visitors, could well be one to steer away from.

Similarly, the disorganised stand, where customers, salesmen and engineers are jostling for very limited space, could well indicate a declining workload.

### On look-out

The DPM who gives himself a couple of hours to cover the exhibition before rushing back to base, is either totally insecure, inefficient or plain optimistic. Such attitudes are duly taken down and noted by interested vendors and rival installation management.

For the company on the lookout for good recruits, Compac offers an ideal opportunity for off-the-formal record meetings.



Keeping in touch at Compac

However a large slice of the job action at Compac involves the trade — whether sales, distribution or services. Salesmen, possibly on the look-out for a new position, lose little time in visiting the stands of potential employers.

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Keep in touch at Compac

But where the stand resembles Hackney Marshes on a particularly inclement day, with stand personnel idly completing a crossword, reading the back pages of Computer Weekly, or charting new programmes every night (BBS), a 300,000 current short of DP professionals (Europe Computing Services) and a 1% annual increase in DP jobs (Data).

Job hunting is by no means limited to senior industry positions. Analysts, programmers and operators can possibly pick up useful leads for prospective employment.

Far from declining, the computer industry is flourishing as many companies reporting record order books, prospects and delivery dates.

Despite the rapid growth, the computer industry is still closely linked and insider trading flourishes at Compac. Keeping close tabs on who is leaving where, and who is joining when, is information retrieval of an impressive processing order.

If, at the end of a gruelling day when all parties feel they have been taking part in a marathon squash and sauna session, some semblance of mutual respect still survives, then prospects for future business relationships seem promising.

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CURRY'S venture into the high street retail microcomputer business appears to have hit problems, as sales of its larger business systems fail to live up to expectations.

Robert Webb, the commercial director of Micro C, resigned last week over a disagreement with managing director Brian Moon on the product range and management and marketing techniques.

Sales of Curry's Micro C 2000 (based on a Pertec microcomputer) and the Panasonic JD 800U are

much lower than expected — "disastrous", said one company insider.

Sales at the lower end of the product range, of the Commodore Pet, the ITT 2020 and the Apple II, have been doing reasonably well, however.

### Prices

Webb joined Curry's 18 months ago after six years with Commodore and it had been his responsibility to develop the product range.

Webb said that he believed the company would have more success with multi-tasking, multi-terminal 16-bit systems, and that prices of existing products should have been cut.

In the future Curry's might find new competition in the high street in the form of a new chain of microcomputer shops which Robert Webb is now planning to set up.

**We're moving**

NEXT week Computer Weekly will come to you from . . . Sutton. Which is a roundabout way of asking readers and advertisers to remember that from Monday, November 10, our address will be:

Computer Weekly,  
The Quadrant,  
Sutton,  
Surrey SM2 5AS  
Tel: 01-681 3500  
Telex: 892084

LOWING its abortive attempt to take over Amdahl earlier this year, Storage Technology has said it intends to manufacture large scale IBM compatible mainframes itself. First deliveries are expected early in 1984 and the machines will compete with the IBM H-series.

Storage is entrusted development of its IBM compatible computer family to an organisation financed by what is described as "a separate, independently owned entity". This set-up is intended to allow Storage to continue using its own financial resources for developing its existing lines of IBM compatible peripheral products and also to remain profitable.

Storage was aiming at. This is due to the much publicised chip problems that have dogged progress of the H-series.

Along with the two H machines, Storage is expected to announce a new 303X computer rated at 2.5 mips that will effectively supersede the 3031 and 3032. It will be upgradeable to the 3.5 mips 3033N and 5.8 mips 3033U. First deliveries will be in the first quarter of 1984.

Costs per mips of the H3 and H5 are over the \$400,000 maximum

sites using its tape and disc drive products.

A key factor determining its validity as mainframe manufacturer will be its progress with emitter coupled logic. At the moment Storage fabricates 1,000 gate arrays in small quantities for special purpose applications in its peripheral products. But its ambitions as a semiconductor manufacturer were

underlined when it called off its takeover talks with Amdahl.

Storage feared that Fujitsu, which owns 27% of Amdahl, might stifle its attempts to become a major supplier of semiconductor components and assemblies to Amdahl.

Fujitsu made no attempt to interfere with the takeover talks between the two US firms but it is known to have approached Amdahl just before the deal was due to be finalised, asking for a review of the agreement under which it supplies Amdahl with large amounts of components and also completed CPUs.

**Key factor**

On the marketing side Storage is in a strong position because of the large established base of big IBM

systems using its tape and disc drive products.

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**Launch delayed**

A LAST-MINUTE "reappraisal"

of its marketing policy for the MicroPact microcomputer has caused the Israeli manufacturer Elbit to postpone its UK launch, due to have been made at Compac.

market with

ties

storage enters IBM compatible race

break trade on the Computer Weekly stand minutes after the doors

user, Quality Books of Northbrook, Illinois, which is alleging that Burroughs "engaged in deception, false pretence, false promises and misrepresentations" when it sold the firm its B800.

\$500m takeover

TAKOVER of Ampex by the US holding company, Signal Companies Inc (CW, October 28) is expected to be completed by January next year now that the two firms have signed a formal definitive agreement. It values Ampex at well over \$500 million and now awaits approval by shareholders.

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**Holiday bookings on viewdata**

THOMSON Holidays is planning to beat Prestel's main limitation from the travel industry's point of view — that bookings cannot be made and confirmed on the system — by installing a private viewdata system to provide a gateway to its mainframe-based reservations system.

The system being installed is a Redifon R800/70, for which Viewdata Pass Through software was announced in July (CW, July 17). Using the IBM 3270 interactive terminal protocol, it will provide a front end to Thomson's IBM 370/158 in central London and will act as a viewdata system in providing information on holiday services.

A six-month trial is to start next spring of eight port system serving travel agents in 10 towns around London, including Bedford, Colchester, Guildford and Reading.

Known as the Z9000, the family

of virtual ports will comprise two segmented processors, the Z8003 6MHz device and the 8003 10MHz device; two unsegmented parts, the 8004, 6MHz and the 8004A, 10MHz parts; and corresponding memory management units, the 8011 and the 8012.

Redifon is developing software to support the ICL CD3 protocol in its Viewdata Pass Through scheme and over the next 18 months plans to do support for X25 using the HDLC protocol as well as other

protocols in the ISO seven-layer architecture that are published by standards bodies.

Other tour operators and travel companies are interested in gateways to reservation computers.

● Olympic Holidays, a London-based tour operator, last week started a trial with four travel agents in the London area of a gateway into its Digital Equipment PDP-11/70 based reservations system.

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## SOFTWARE FILE SPECIAL

THIS week Programmers Page and Software File combine to take a close look at something that will profoundly affect the areas they deal with: Ada, the new high level language from the Pentagon.

Ada seems to have been lurking "just around the corner" for a long

time. Now its arrival really is imminent and interest in it is hotting up, as attested by the formation of two consortia, Augusta and the "3S" group, in which UK companies have allied to meet the expected rush of Ada contracts.

For a language that has been the

subject of so much speculation, solid facts about grammar and syntax have been hard to come by. Now, on the eve of a major conference on the Impact of Ada to be held next Tuesday at the Royal Institute of Architects, Dr Brian Wichmann gives Computer Weekly

readers a preview of what the language will actually look like and how it will work.

Wichmann, of the National Physical Laboratory, is chairman of Ada-Europe and, as a world authority on high level languages, has been the consultant to the design team.



# How Ada will cut cost of producing large-scale systems

THE Ada programming language has been designed for the US Defense Department with the UK playing an important part in its development.

Though aimed at real time systems, the impact of the language could be much greater since Ada is a general purpose language overcoming these problems by requiring that all interfaces between Ada components are specified in many areas.

It is recognised that the development of software systems is non-linear. That is: the cost of producing large systems is often more than that of its constituent parts. The reason is the additional cost of designing the interfaces between the sub-systems and integration (and testing) of the total system.

Current programming languages are poor in this "programming in the large" because the large scale design concepts cannot be expressed in the language.

### Compatible

In some systems, one cannot even guarantee that components of a system are compatible on inter-

faces. For instance, with Fortran, most systems do not object to a routine being called with an incorrect number of parameters or with integer rather than floating point parameters.

The Ada programming language overcomes these problems by requiring that all interfaces between Ada components are specified in many areas.

Implementations are required to check the compatibility of these interfaces — indeed such checking cannot be avoided since there is only one such specification. The critical Ada component which is used to break down systems into manageable proportions is the "package".

The package usually comes in two parts: the specification and the body. The body is effectively the implementation of the specification. The parts are quite separate, the link being the name (which is the same). The specification must be provided first, and can be compiled in isolation.

Hence with a large system with many specifications, compile-time

checks can be made at an early stage to detect at least some inconsistencies.

The major reason for making the specification separate is that the body can be changed to incorporate some improvement or remove a bug with the assurance that the interface is the same — a fact checked by the compiler.

### Examples

To consider the impact of Ada packages further, a series of simple examples are presented. It must be admitted that these examples are much simpler than the real world, but nevertheless they indicate how Ada should work in practice.

In this first example, consider a graphics package which must record the status of the pen during the plotting. The essential data consists of a value which is true if the pen is up, and false if it is down, the rest of the data being the co-ordinates of the pen. In Ada, this is written as:

```
PACKAGE PLOTTING_STATUS IS
  PEN_UP: BOOLEAN;
  X_POS, Y_POS: REAL;
  and PLOTTING_STATUS;
```

This is the specification of the package, which in this case completes the package. A compiler can compile this as a complete program unit which will then allow its use within other procedures and packages.

In fact the user needs to place in front of the program unit the clause:

with PLOTTING\_STATUS;

Then the components of the package can be referenced as:

```
PLOTTING_STATUS. PEN_UP
or
PLOTTING_STATUS. X_POS
```

However, in many contexts the repeated reference to the package name is unnecessary and clutters the text. Hence a programmer has the option to write in the program: use PLOTTING\_STATUS; so that subsequently the variables PEN\_UP etc can be referenced directly.

Note there is only one specifica-

## Component interfaces are specified by the language

### From page 6

records are given, one as a variable and the other constant. The constant is given an initial value by specifying that Monday to Thursday will be 8½ hours, Friday 7 hours and Saturday and Sunday nothing.

The advantages of such a package are now apparent. Users can declare variables of type DAY, write procedures having parameters of type TIME\_TABLE etc. Moreover, all these interfaces are checked by the compiler, for instance, a statement such as D := 1; (D is a DAY) and WORK\_HOURS (1) := 2; are rejected although their equivalent would be permitted in lower level languages.

Although this example is more extensive, it still lacks a body which is needed for our next example.

### Executable

In Example 3, we consider a case which requires some executable code as well as types and data. This is a rational arithmetic package. Again, it is hardly a comprehensive example but merely sufficient to illustrate the ideas.

The specification of the package is as follows:

```
PACKAGE RATIONAL_NUMBERS IS
  type RATIONAL is record
    NUMERATOR: INTEGER;
    DENOMINATOR: INTEGER
      range 1 .. INTEGER'LAST;
    end record;
  function EQUAL (X, Y: RATIONAL) return BOOLEAN;
  function "+" (X, Y: RATIONAL) return RATIONAL;
  function "*" (X, Y: RATIONAL) return RATIONAL;
  and RATIONAL_NUMBERS;
```

The user of the package requests the package by the usual 'with' clause.

One can then declare variables of type RATIONAL, call EQUAL etc.

The operations "+" and "\*" are called in the conventional way as infix operators:

-- User's program skeleton
 with RATIONAL\_NUMBERS;
 procedure USER\_PROGRAM is

-- some declarations
 R, S: RATIONAL;

R := (3, 5);
 S := (1, 1);
 if EQUAL(R, S) then

end if;
 R := R + S; -- RATIONAL

-- addition
 end USER\_PROGRAM;

### Timetabling

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In Example 2, we consider

timetabling problem. In this context there are a large number of terms in everyday use which are not available in programming languages.

Ada meets this need in the

way as Pascal by permitting a programmer to declare new types which correspond to the application vocabulary.

All of these terms can be placed

in a single package so that the programmer can extend his vocabulary by a single "with" clause.

In this case, our example will be:

package WORK\_DATA is

type DAY is (MON, TUE, WED,

THU, FRI, SAT, SUN);

type HOURS\_SPENT is date

0..01 range 0..24;

type TIME\_TABLE is array

(DAY) of HOURS\_SPENT;

and NORMAL\_HOURS: constant

TIME\_TABLE :=

MON .. THU => 0.25;

FRI => 7.0;

SAT/SUN => 0.0);

end WORK\_DATA;

This is an example of an enumerated type where values of the type can only have the values MON, TUE etc. The advantage of such types is that it avoids "magic" numbers where 0 means Monday.

The type HOURS\_SPENT is an example of the approximate type where values are stored within 0.01 of an hour.

The array type TIME\_TABLE

can now be specified which gives a weekly record. Two weeks

later

Turn to page 7

### Hidden

The importance of the separation of the package body can now be illustrated. The procedure SAME\_DENOMINATOR is local to the body and in consequence its name is not visible to the user.

Only the specification of these functions is provided in the package specification.

The body of the functions is to

HALF: RATIONAL := (1, 2);

The functions EQUAL, "+",

and "\*" are provided as part of the package and represent operations on the type RATIONAL, presumably coded to provide the conventional meaning.

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&lt;p

**MICRO NEWS**

# Japan effervesces with magnetic bubble plans

**MAGNETIC** bubble technology is here to stay. Several semiconductor companies, both in the US and Japan, are now tackling the problems associated with the launching of bubble memory systems, like the emergence of an industry standard bubble subsystem architecture and the development and availability of suitable cost-effective controllers.

Dr Peter Walker of Meckintosh Consultants, having attended the fourth International Conference on Magnetic Bubbles in Tokyo last month, reports on the progress of magnetic bubble technology in Japan.

Japan has demonstrated a clear commitment to make bubble technology work, with at least four companies having an extensive production capability as well as R&D. Hitachi, having shipped 64K bit chips for a number of years, is now supplying 256K bit devices which are being used by NTT in a transportable electronic switching system. The 64M bit magnetic bubble memory system for use in the database machine developed for the Pattern Information and Processing System (PIPS).

The 1M bit bubble memory chips are now reaching an advanced stage of development, with simple devices expected to be available from a number of sources during the next two years. These include NTT, Fujitsu, NEC and Hitachi in Japan, and Rockwell, Intel, TI, Motorola and National in the US.

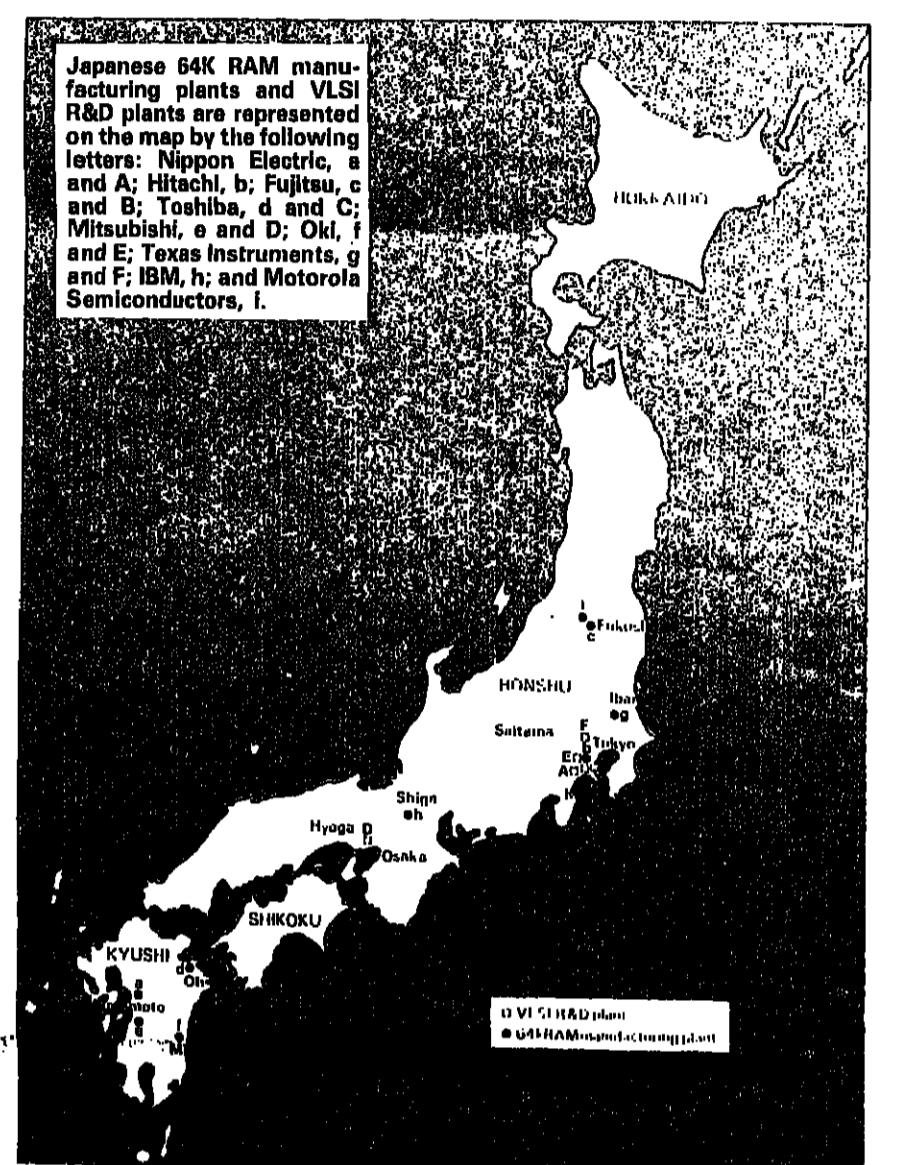
NICC sees many applications for bubble memories in the merging area of computers and communications and is now manufacturing 256K bit devices with the 1M bit scheduled for 1981. Such devices are being used in an experimental one megabyte audio response system and are expected to find increasing applications in telecommunication equipment.

**Imaginative**

Perhaps the most imaginative approach has been taken by Fujitsu with the development and shipment of magnetic bubble cassettes. Although not cost-competitive with tape cassettes, the magnetic bubble cassettes may be used in hostile environments subjected to vibration and atmospheric pollution.

Existing applications demonstrated include program loading into numerically controlled machine tools, word processing applications and terminals in which the cassette plugs directly into the keyboard and general data logging. The original 8K byte cassette has been followed by the 32K byte and a family of 256K, 512K and 1M bit chips have now been developed for a range of 128K byte cassettes.

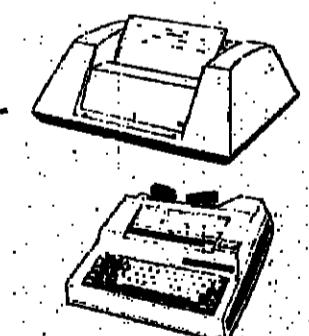
Using a parallel organisation of 128K bit



...when you need a dependable supplier, an authorised distributor with a comprehensive range of products at keen prices, backed by large stocks for fast delivery, with full after-sales support. We promise you a rapid response.

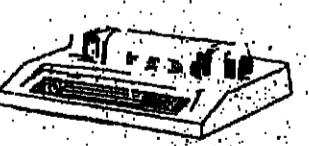
**ANADEX DP8000**

from only £494

**TI 746**

Portable 30 cps terminal including acoustic coupler weighing only 13 lb. Thermal 8x7 column, 80 column print, RS232C serial interface as standard. 80 ASCII set, 8x7 font. Variable tractor. Form handling facilities. 1K buffer store. Options include 2K extra store, IEEE interface.

from only £1049

**DIGITAL LA120**

120 cps keyboard terminal. Optimised M-discriminating keyboard. Built-in dot matrix printer. 80 column print, RS232C serial interface, RS232C serial port. 2000 character storage. 8000 baud. Full form handling facilities. Options include expandable 4K buffer. APL, BASIC, monitor and keyboard sets.

from only £1250

**LEAR SIEGLER ADM-3A**

The most popular visual display in the world. 1000 characters resolution. Cursor addressing. Dual interface. Monitor port. Wide range of speed and word formats. Options include Tektronix 1010 compatible graphics.

from only £1656

**LEAR SIEGLER ADM-31**

Low cost VDU with two page display and full editing features. Dual interface, RS232C serial port. Up to 1000 characters resolution. Cursor addressing, editing, search, sort, print, copy, paste, etc. Options include RS232C interface, RS232C serial port, RS232C serial control port, RS232C serial printer port, etc.

from only £795

**PERIPHERAL HARDWARE LIMITED**  
Amfield Close West, Morden, Surrey KT10 0EJ. Tel: 021 606 0000

by Eileen Stainer

## Black Box III offers network facilities

MULTI-USER networking seems to be the Rail with the introduction of Black Box III range of computer systems. The four will be able to run single-user operating systems. MP/M multi-user equivalent, the CP/NET networking system, USX systems house Digital search.

All four models comprising RAM, as in the previous, but this time it is expanded by a megabyte. An inexpensive memory management unit or the addressing by the use of printing registers.

The 3/10, priced at £2,000, has single floppy disk support providing 1Mbyte memory and dual serial ports. With add-on Winchester drive, expanded memory, VDU's and two printers it comes as multi-user system between £10,000 and £12,000.

Models 3/20 and 3/30 have floppy discs and built-in 80K Winchester discs from Sharp, providing an extra 6Mbyte memory. A 3/20 system with the dual floppy discs costs £23,000 while the 3/30 with a single floppy disc and single 5 1/4 inch discs around £3,500. Both will do as stand-alone single user operation with one VDU and price £4,000 to £6,000.

The 3/40 model, when used as an eight-inch Winchester disc, is configured in a multi-computer network. The system, which has eight-inch disc, costs about £12,000 and each add-on disc adds £2,500, providing an extra 5Mbyte of storage per disc. Eight Winchester discs can be connected.

## OP SPOT

# 'A Royal College of Ops is what we need'

AMONG the reasons given for the lack of both a career structure and a set of recognised qualifications for operators is that operations is a young and low-status trade in a young and volatile industry. The argument has it that it is therefore inappropriate, even pretentious, to impose standards.

Ian Cheeseman disagrees with this kind of thinking and says: "This is not a young industry, just a disorganized one."

Cheeseman has a number of ideas on how the operations side of computing should be organised. These hinge on the notion of forming a professional body exclusively for operators.

He has no too high an opinion of the British Computer Society, and says: "The BCS is geared to programming and analysis and treats ops staff as dogbodies." He would be happier seeing such a professional body hanging on the tails of the IDPM, but ideally he would like it to be independent.

"I'd like to see it work on the lines of the Royal College of Nursing. This is a well-respected organisation representing the working section of the Health Service."

**Status**

Cheeseman makes what seems an odd comparison between nurses and operators. "Both groups of workers," he says, "are involved in the doing rather than the thinking parts of their trades. Both have traditionally been paid less and given less status than their more exalted colleagues. The major difference is that nurses don't operate."

In this context it is worth sketching the role of the Royal College of Nursing. It splits its activities into three categories: to boost the nursing profession, to handle labour relations and to promote higher educational standards within the profession.

Cheeseman reckons that a recognised qualification would bring several advantages. It would give dignity and cohesion to what is still perceived as a marginal trade. It would stop failed programmers turning to operations work and it would allow employers to judge the abilities of an applicant.

All in all, it would amount to a jump in the status of the operator. Not that Cheeseman thinks that

operators have any reason to feel inferior. "If all ops stopped working tomorrow," he says, "the country would fall apart . . . the country relies on a class of people who are insulted and denigrated by the people they work for. We all know the old story of operators being like mushrooms. They're kept in the dark and a bucket of manure is thrown over them every now and then."

The introduction of examinations backed by an Institute for Operators would also tend to allow a recognised grading structure to emerge. At the moment a shift leader, for instance, means anyone from the boss of a bunch of ops at a large installation to the person who is flogging it over his mate because he joined the company three weeks earlier.

As ops grow more specialised staff will be identified by job function rather than job title. The identification by job function is the approach that Infotech has started to take when filling up its courses.

Cheeseman readily admits that on paper his qualifications are minimal, but he has been in the industry long enough to be confident of his skills. He started in ops in 1970 and after seven years did a stint as a contractor. He was recently appointed superintendent of computer operations with an insurance company and is working for the ACII insurance exams.

## SMAC in the ICL

THERE is a power supply failure in the SMAC unit of an ICL 2900. Call the engineer? Pop down to the local for a swift half? Go home?

One dedicated op found the perfect solution at his 2900 installation when the warning lights started to flash. A hefty whack of the time switch in the SMAC solved all the problems and everything was running smoothly before anyone had noticed anything was wrong.

THE problem with predicting is that the predictions are usually either vague or wrong.

The good news comes from the Lock Management Personnel Group's autumn report on salaries in the South and South-East England (excluding central London).

It says: "Operations staff's salaries generally have moved up by between 20% and 30%. Operators are up by 25% but trainee operators, by 30% to 60%, presumably in an attempt to attract more people to the job."

If you start congratulating yourself on having mounted such a glittering bandwagon, consider the gloomy news from an Urwick Computing report which aimed to forecast the next 12 months' staff requirements. As at June 1980 this indicated that 10% of installations intended to increase employment for operators and data entry staff; 64% of the installations surveyed reckoned that their requirement would remain the same, and the other 26% expected to decrease ops staff.

## Pattern

He envisages a two-year training period for operators similar to old-style craft apprenticeships. The training would be divided more or less equally between the machine room and the classroom. Initially the trainee would get some hands-on experience to be consolidated in the class, a pattern which would be repeated throughout the training.

There are, of course, any number of topics which could be covered: the theory of telecommunications, networking, virtual storage, what 450K-bytes per second means, etc.

In Cheeseman's ideal world such a course would culminate in a pair of examinations covering the practical and the theoretical aspects of operating. He feels that as operations is becoming increasingly technical and as operating systems are becoming more similar, an examination for all operators could easily be devised.

In this context it is worth sketching the role of the Royal College of Nursing: It splits its activities into three categories: to boost the nursing profession, to handle labour relations and to promote higher educational standards within the profession.

Formed in 1916, it has a role in advising government and generally protecting the interests of its members and the patients. Since 1977 it has been certificated as a trade union although, as Cheeseman points out, nurses are at liberty to

Not that Cheeseman thinks that



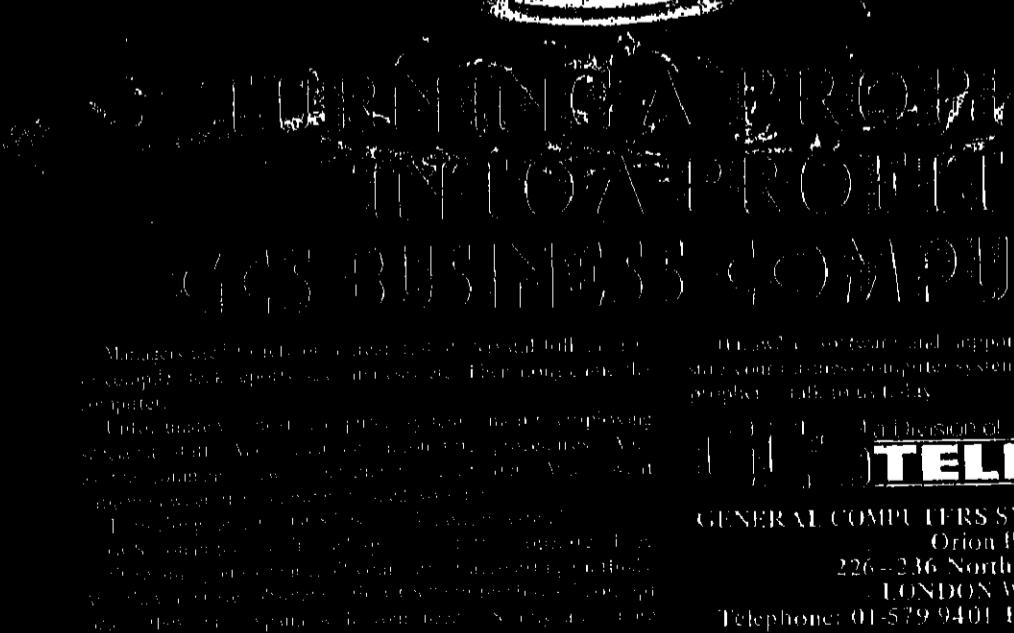
IAN CHEESEMAN . . . "If all ops stopped work tomorrow the country would fall apart."

## No withdrawal problem

I HEAR that the problem of nicotine withdrawal in the computer room has been overcome at one site by the old habit of snuff-taking.

The operators rip behind the tape decks for a swift snuff and partially satisfy their craving for a fag. There are no tell-tale plumes of smoke or sprays of exotic powders.

I was also told that operator's pay doesn't stretch to cover the purchase of more powerful and exotic powders.



Managers and technicians at several firms say they accept the idea of operators taking a cigarette break.

One manager said: "It's not a problem. We've got a smoking policy. You can't smoke in the computer room but you can smoke outside. It's not a problem, it's a fact of life."

Another manager said: "It's not a problem. We've got a smoking policy. You can't smoke in the computer room but you can smoke outside. It's not a problem, it's a fact of life."

A third manager said: "It's not a problem. We've got a smoking policy. You can't smoke in the computer room but you can smoke outside. It's not a problem, it's a fact of life."



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## COMPANY NEWS

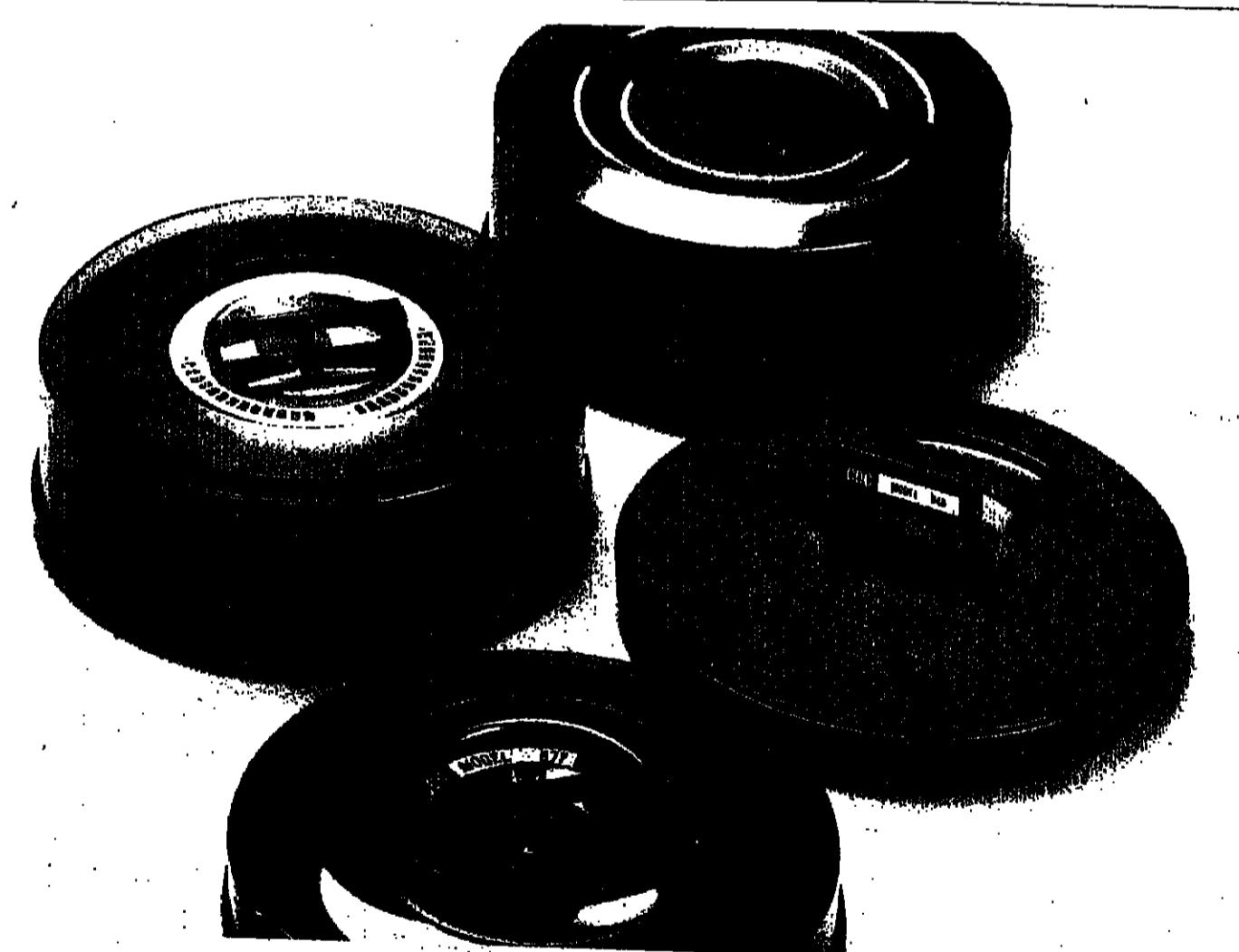
### Guide to raising risk capital

FINANCE hungry young companies could be interested in a slim but free booklet\* published by Harvard Securities outlining the ins and outs of over-the-counter market flotations for raising long-term risk capital. It is essentially designed to promote security dealer Harvard's own services.

Harvard says that it has spent two years researching and preparing over-the-counter flotations. Factors looked into include the criteria which a company should satisfy in order to be considered for a potential flotation, the vetting procedure and stages leading to the preparation of a prospectus, the actual flotation, the floated company's responsibilities after the flotation and the "making of the market" in a company's shares.

So far Harvard has only completed two over-the-counter flotations but the company points out that at least two-thirds of the 27 companies that have seriously considered a flotation have been firms with products and/or services in

\*Equity Finance for Young Growth Companies, Clive Lawrence, Harvard Securities Ltd, York House, Westminster Bridge Road, London SE1 7UT. Tel: 01-928 8691.



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### Univac turnover up 12%

THE information technology industry.

Harvard says that it acquired considerable practical experience of financing and managing such a company when it provided a microprocessor software and systems designer, Hyperion of Brighton, with £70,000 development finance in January 1979. There was a longer-term view to eventual over-the-counter flotation but in the event Harvard sold its interest in Hyperion to Racl in June last year.

In August 1978 Harvard retained Dr Stephen Castell to help in the design of over-the-counter schemes. Dr Castell, a former merchant banker, set up a company, Castell Computer and Systems Telecommunications, about two years ago to act on behalf of security dealers. They grew by 39% and 48%, respectively.

Sperry Corp net profits increased 15% to \$77 million.

### Zygal buys UK arm of Telefile

TALKS between the UK firm, Zygal Dynamics, and Telefile Computer Products Inc, about a take-over of Telefile's UK subsidiary (CW, April 10) have reached the stage of an agreement in principle. A deal is expected to be completed this month.

Zygal was set up in December 1975 by Con Driscoll and John McLean from the defunct Rank Xerox Data Systems and a major part of its business has been selling printers and terminals built by Xerox subsidiary, Diablo.

Because of the Xerox background, Zygal was hired to set up Telefile Ltd in early 1976 by the US parent and has managed the UK company ever since on behalf of Telefile Inc. Now Zygal is paying Telefile Inc an undisclosed sum to take over all the assets of Telefile Ltd, including its staff. Most of them are engineers maintaining Sigma machines and associated equipment in the UK not serviced by Honeywell, the firm that took over the Sigma user base worldwide in 1975.

But the star performers at the moment are the aerospace and defence sides of Sperry's business, represented by the Sperry Division and Sperry Flight Systems. They grew by 39% and 48%, respectively.

Sperry Corp net profits increased 15% to \$77 million.

### Japanese firms do well

TWO of the biggest Japanese-owned computer manufacturers, Fujitsu and Nippon Electric, have published financial results for the first half, ended September 30, of their current financial years.

At Fujitsu, overall turnover increased by only 2.4%, mainly because of a big fall-off in sales of telecommunications kit to the publicly owned Nippon Telephone and Telegraph. But sales of computers and data communications equipment increased by 20% to account for more than 65% of the \$1,310 million total.

At Nippon Electric total sales for the first half rose by 27% to \$1.93 million, while net profits rose 34.4% to about \$10 million, while exports more by 14.5%.

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## PEOPLE and EVENTS

### Wilkes-PCA names its main board members

JOHN MATTHEWS has been appointed main board director of the recently formed company Wilkes-PCA Data Supplies. He joined the Wilkes Group in 1978 as general manager of Wilkes Business Products and his previous managerial experience includes a period as business consultant to the Iranian National Airline.

Gordon Currell has responsibility for the profitable expansion of the new company, in his capacity as director and general manager. He has been with the Wilkes Group for 31 years, serving

most recently as director and manufacturing manager. He formed the Online Division 18 months ago.

Divisional manager of the PCA interest of the company is Keith Brook. His experience of data processing has been gained as marketing services manager of Philips Business Equipment Division and general manager of Pyral UK.

Immediately prior to the new appointment, he was marketing manager of PCA Data Processing Accessories, a post he held for two years.

and technical director Noel Jones will continue in their present posts.

Frank Jackson has been appointed to run the new Birmingham office of Allan D'Morais and Associates. He was formerly information systems manager of the Computer Special Systems Group at DEC.

The marketing activity will be headed by David Lamb, who will be responsible for all marketing, public relations and sales.

The company's five operating groups - Consultancy, Commercial and Business Systems, Advanced Applications, and C3 and Micro Applications - will report via their group managers to managing director David Marks.

Commercial director John Coombes



### Director of publications

NEW post of director of publications at Urwick Nexus has been filled by Maryanne Chade. The appointment makes her responsible for the publications' infrastructure that supports the company's education programmes, research, training and consultancy activities.

Urwick Nexus will produce regular newsletters, reports and monographs under Chade's direction. She was educated at Oxford and Stanford, US, and began her career with Pengo Books. In 1979 she became production and copy editor of a Geographical Journal.

Semiconductors in 1973, when he continued as marketing director.

John Kemp and Michael Vasey have joined Michel Vasey Data Communications. Kemp is sales executive; Vasey joins as systems manager to develop the company's range of dc and msu systems.

Hugh Thomson has been appointed marketing manager with Wella Microelectronics Institute. Since February this year, he has been a management consultant at Unilever International Management Consultant.

Malcolm Irwin has been promoted to the position of branch manager at Prime Computer. He joined the company at the beginning of 1978.

Ken Bradshaw has taken over as marketing director of the Plessey Solid State Division. He joined Plessey

in January 1982.

As there is a limit of 256 entries should be returned in one search. The closing date is December 31. More than one team may be entered by any one organisation.

Applications should be made to organisers, 1981 Wright Line Squash Tournament, SP&L Ltd, Penton Suite, Turf Hill, Middlewood, Great Brentford, Middlesex, Tel: 0800 560 2257.

Matches will take place initially on a regional basis. First round matches will begin on February 1, 1981, with the

finals in January 1982.

A former operator, Hitchen said: "He may sit down and think 'I can work out something for myself here and go on to cheat the system.'

"Computer crime, you see, isn't

the stripped jersey and mask type. It's rather like leaving £5 notes inadvertently status."

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the stripped jersey and mask type. It's rather like leaving £5 notes

inadvertently."

Fraud often involves the entering of data after the main validation run and every month or so it is advisable for the manager or accountant to insist upon an immediate rerun for security purposes.

"Any discrepancy will show up

immediately and should be investigated immediately," he said.

### Software house restructures

LEAMCO Software has reorganized its structure as part of a new growth

plan. The marketing activity will be headed by David Lamb, who will be responsible for all marketing, public relations and sales.

The company's five operating groups - Consultancy, Commercial and Business Systems, Advanced Applications, and C3 and Micro Applications - will report via their group managers to managing director David Marks.

Commercial director John Coombes

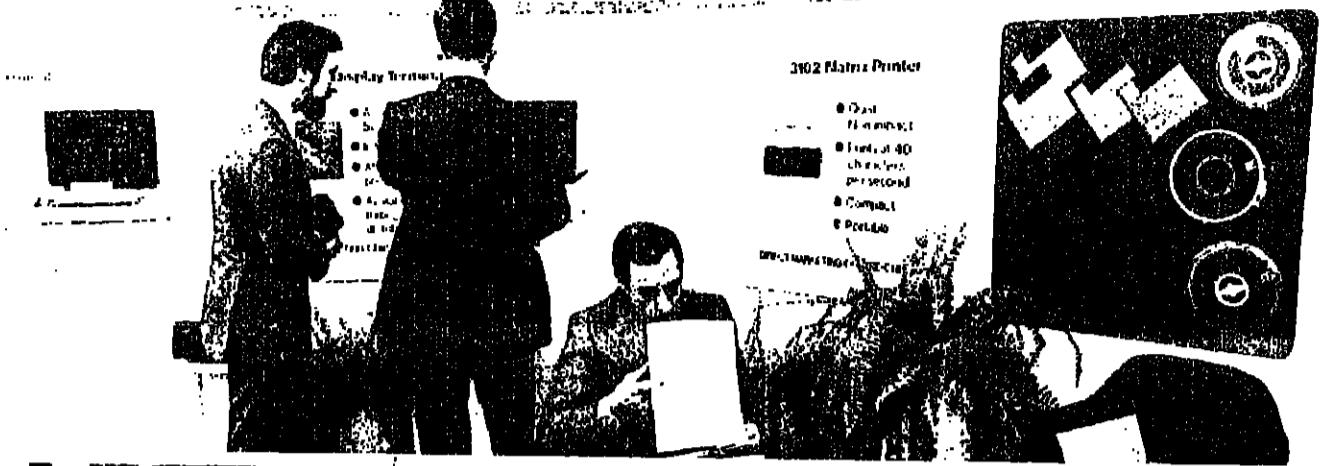
is leaving the company.

Commercial director John Coombes

is leaving the

**COMPEC 80**

the display terminal...for IBM and non IBM users IBM



## Thousands visit our computer show

TONIGHT (Thursday), the UK's biggest and busiest computer show will be over for another year. Over 350 stands will have been dismantled.

From the 10.00 am start on Tuesday to the 16.30 pm finish this evening, tens of thousands of people have flowed through the turnstiles. Once they'd fanned out across the exhibition floor, old, half-remembered faces were spotted across a sea of heads and friendships renewed.

Tucked away in a corner of the hall, IBM was exhibiting for the first time at Compec. On show was a terminal and a 3202 matrix

Behind the comradery was a truly busy of any other marketplace. You could almost smell the money in the air and you could certainly hear the crackle of sales transactions. Who knows what deals were struck?

There was something for every visitor. Among the highlights of the show were IBM's welcome Compec debut, the 12 computers on the Canadian stand, and Computer Weekly's free job finder service.

Now that jobs, even computer jobs, are becoming harder to find, it came as no surprise to find that the job finder was well used.



ABOVE - visitors to British Telecoms' stand were able to see a number of the latest fax machines designed for use on the Public Switched Telephone Network. In addition, video terminals were in operation to demonstrate data communications over the Eurodata network.



**Reason enough!**

### Advanced enough

- Norsk Data's experience—over ten years—has gone into the design
- Our systems were interactive from the beginning
- The NORD-100 was the first high performance CPU on a single board
- From 128 KB physical memory up to 32 MB

### Friendly enough

- The most advanced operating system on a mini—SINTRAN
- Designed to help the programmer and the user
- Time sharing, real time, batch and communications can run together
- Up to 64 users
- FORTRAN, COBOL, BASIC, PASCAL, RPG II
- A Codasyl DBMS, ISAM, data entry and text processing software available
- Emulators for IBM, CDC, Univac and Honeywell
- X.25 packet switching

### Expansion enough

- Over 2000 MB of disc space on one system, tapes up to 6250 BPI, and a wide choice of printers, other peripherals, and interfaces
- The NORD-100 can be configured with a NORD-500 CPU to give powerful, 32 bit performance



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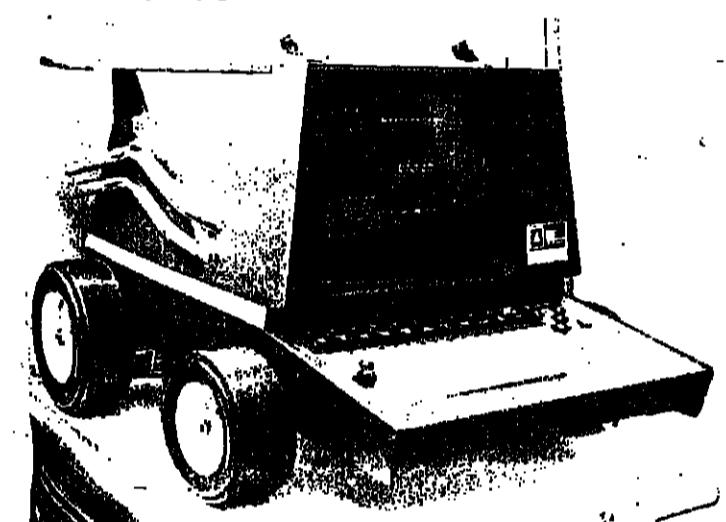
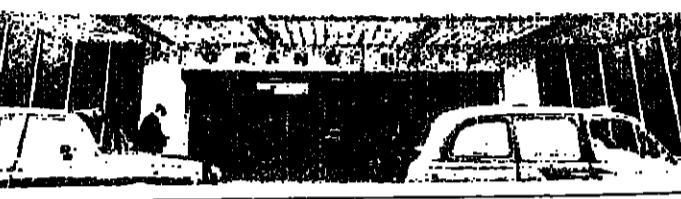


Anyone for roller disco? If there was a connection between Modular Technology's mains-powered fibre-optic

ABOVE - Sharp used Compec to launch its PC3200 business machine, scheduled for release in February 1981. The machine will be supported by Sharp's own software and packages including invoicing and stock and production control.

Modem 4, 5 and 6

RIGHT - all quiet on the Compec front just before the crowds arrived on Tuesday.



Just to prove it can do specials as well as standard units, Delta Data Systems knocked up this little number. The sports model features twin carburetors.



An operator tries out Computer Automation's new data terminal. The SyFa 100 data capture and preparation station, introduced to the press last month, was seen by the public for the first time at Compec.

## CACI London Data Analysis

A one-week course and workshop to be held on December 8, 1980, at the Clarendon Court Hotel, Maida Vale, London, W9. This is a public presentation of the course based on six years of practical development by CACI of techniques for the analysis and development of integrated systems and is invaluable for all analysts concerned with the top-down approach.

For further details and registration forms ring Ian MacDonald on 01-406 8233, or write to CACI, Inc International at 289 High Holborn, London, WC1V 7HZ.

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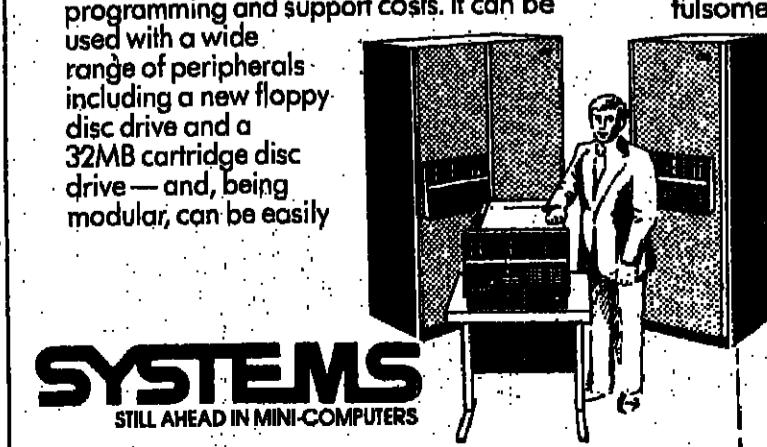
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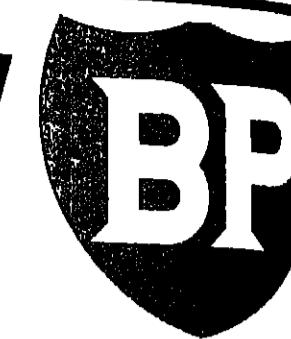
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# Computing in a company as big as a country



BRITISH PETROLEUM is by far the largest company in Britain and the second biggest in Europe. With gross revenues of £23,033 million last year, it is the sixth largest company in the world. Its sales equal twice the amount of IBM's and 30 times those of ICL.

BP's revenues are not just derived from what is usually thought to be its traditional oil and natural gas operations. BP owns, or has an interest in, hundreds of subsidiary or associated companies located throughout the world. Its chemical derivatives appear in thousands of products from detergents to motor vehicles.

## Gold

It is one of the largest suppliers of animal feed in Europe, owns one of the world's biggest shipping fleets, and has, for example, 5,000 auto accessory shops. In recent years, it has increasingly diversified into areas such as coal, minerals, and metals such as uranium and gold, and BP is now the eighth largest private coal company in the world.

To offer computer techniques and services to users throughout the company, BP organises its data and information processing operations in line with the way the BP group itself is organised.

BP Trading is responsible for the business activities of the BP Group. It acts as the corporate head office and is divided into international business trading streams relating to activities such as fuel sales, tankers, oil production, chemicals etc.

Within BP Trading there are a number of service departments, created to provide support facilities for all such business streams. One of these is the computer services department.

The next layer of the company's structure consists of the principal operating companies throughout the world. These operating companies are either organised on a national basis or they are product-related organisations, such as BP Chemicals and its subsidiaries or associated companies. Groups of operating companies also exist in many countries with major operations in the US (which includes BP-majority-owned Sohio), France, Germany, Australia, and Canada. Such companies each control a number of subsidiary or associated companies. Thus, each country's operating organisation may be responsible for numerous BP activities ranging from oil and

chemicals to coal, minerals and so on.

The overseeing head office companies of each of these operations are also supported by service departments including computer service operations. Separate from these computer and service operations are many specialist departments, many of which also employ their own computer people specialising in particular areas, such as process control, research and in-plant computing.

Annually every BP company makes a return listing the principal computer hardware (ie mainframes and peripherals), main operating software, languages used and the number of data processing professionals employed within each computer department. The resulting Black Book, containing single line entries and no detailed descriptions, currently runs to some 100 pages of small print and does not even cover micros, word processors or mini used in special applications.

It is at this point that one can begin to grasp the scale of data processing within BP, and Computer Weekly's confidential analysis of the Black Book produced some interesting figures.

In Computer Weekly's estimation, the principal computer operating centres of BP worldwide had a combined budgeted turnover in excess of £90 million this year alone. The value of central hardware installed (though difficult to assess precisely) is of the same order. Computer staff employed in the main centres number some 4,000, almost half of these in the UK. Many, including the staff of the BP-owned Scicon Group, are consultants in their own right.

The BP Group in Britain also recruits a significant number (150 this year) of graduates into computer activities. Finally, the Black Book reveals a massive volume and wide range of mainframes and minis.

## Dominance

There are some 30 mainframes in the UK alone, BP's mainframe concentration being based on Univac 1100 hardware. There are eight very large Univac configurations in Britain, including two 1100/82s each with 2096K-word capacity. These, with an 1100/21, are run by BP Trading's Computer Services Department. They utilise some 14,000 megabytes of disc store and run literally hundreds of online terminals linked into various user departments.

BP Oil, the associate company responsible for refining, marketing and distribution of petroleum products in Britain, also runs an 1100/81 and 1100/21. With three similar Univac 1100 configurations at Scicon Computer Services, Univac has obviously achieved computing dominance with BP in the UK.

ICL emerges as the second major mainframe supplier to BP in Britain, with nine 2900 installations.

On an international basis, it is IBM that dominates with three 370 installations in Britain and 20 more 370s throughout the rest of the world. Additionally, IBM has found niches for System 34s, System 3s, System 7s, 3033s and 3031s as well as 1800s used in process control. Finally, there are several IBM 4300 Series machines both installed and on order.

This is not to say, however, that other manufacturers are shunned. For one can still find Burroughs

installations, ranging from B-80 up to a B-3700, and a number of CII-Honeywell Bull installations (61 and 64 Series). There are also CDC Cyber 175s in the US and an Amadai 470V5 in France.

In the mini area we counted

many large DEC PDP-11s and VAX 11-780s. A variety of other manufacturers also get a look in, ranging from Texas Instruments (TI 980s and 990s), to Hewlett-Packard (HP 1000s and 3000s), Ferranti (Argus 500s), Rediton (Seecheck), Data General (Eclipses), Datapoint (1500s, 2200s, 5500s and 6600s), Nixdorf (620), and many others besides.

## Autonomy

In some respects this may seem an unusually mixed bag of hardware, particularly as there is no international standardisation of mainframes in the main computer centres. However, one must take into account factors such as the BP

principle of giving its operating companies a high degree of autonomy. Additionally, with a number of the installations, the relationships with manufacturers are historical, being based on different requirements at the time of installation.

Finally, within the context of autonomy, one must also consider the size of the individual BP organisations in their own right - BP Oil's 1979 revenues in the UK alone were almost four times the total turnover of ICL.

Old tabulating machines apart, and a pre-1962 Deuce system used mostly for scientific work, ICL (ICT) supplied the first commercial systems to BP Trading during the early 1960s, firstly a 1301 and later a 1905. The latter part of the 60s saw the first selection of Univac kit. This was based on the need to further develop linear programming techniques, an area in

• Turn to page 17

Large multinational organisations are rarely willing to talk about their operations, even less so about their use of computer techniques. But for the first time, Computer Weekly has been able to examine at close range Britain's largest company - British Petroleum.

BP is big - its annual turnover is larger than the gross national product of Greece, Finland or Bulgaria.

In this, the first of four articles examining BP's data processing operations, we look at the structure of a multinational company.



Above: BP's drilling rig Sea Conquest, east of the Shetlands.

Left: Flare stack and drilling rig on board production platform FB (Graythorpe II) in BP's Forties oilfield in the North Sea.

• Turn to page 17

## Users have a major say



From page 16

say in computing requirements, an essential feature being a computer planning advisory group which involves senior management representatives of the largest user departments within BP's headquarters.

BP's computer services department's general manager, David Eggleton, considers that information processing needs must be driven by corporate requirements and service departments must tailor their development plans to the needs of users within the organisation.

If users play a significant part in the definition of forward computing needs, BP's computer department management believe they are in a much stronger position to influence hardware and software.

As micros, minis, word processors, electronic mail systems and other types of information handling systems are being increasingly installed direct into user departments, a new emphasis is placed on the role of the central information processing department within large organisations.

In particular, within organisations such as BP, more and more information is being stored and transmitted electronically, and with this information being increasingly regarded as a corporate asset, it is necessary to develop and implement policies for guarding and co-ordinating its use within a company.

BP is well aware of this and feels that its computer departments have a part to play in the development and operation of communications networks and software packages which will ensure the security of information.

## User-driven

Although there will still be a need for certain application developments to be carried out in central data processing departments, BP thinks that the future will show an increasing emphasis on the support of user generated developments.

David Eggleton says that most computer manufacturers are recognising these increasingly user-driven attitudes and that, certainly in BP's case, they are becoming more prepared to talk about their planned technical developments. Such advance knowledge is important for organisations the size of BP as it enables them to develop long-term strategic requirements for central and distributed systems.

An advantage of being a major international purchaser of computer hardware is that most manufacturers are prepared to listen to the company's requirements, but BP has made it clear that only those manufacturers prepared to talk about their future developments are likely to be considered in BP's own forward plans.

• Part Two of this series will deal with the DP role in channelling natural resources into usable products.

Users within BP have a major

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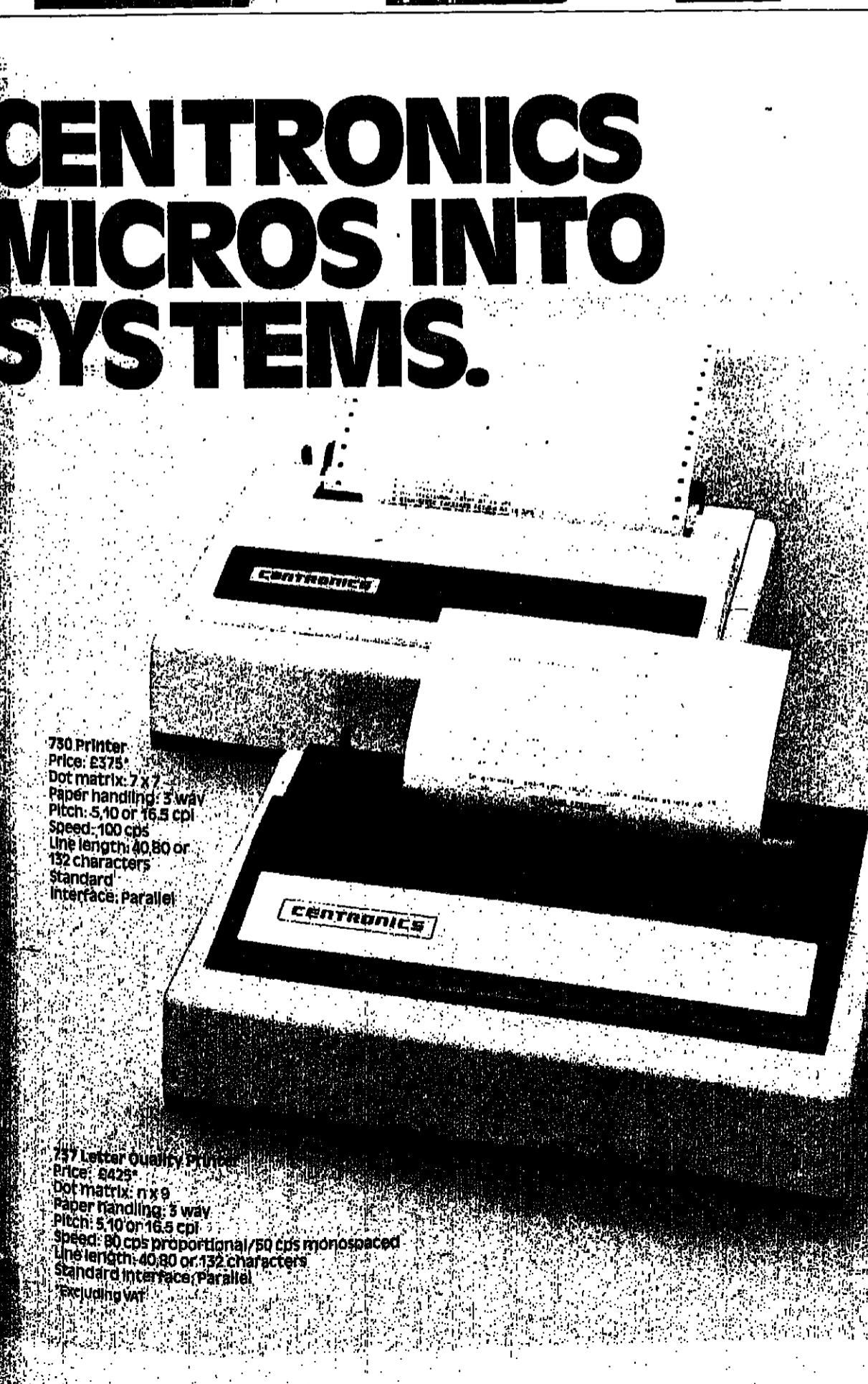
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**BOOK REVIEWS**

## Chipping away at probability

A book on casino craps, by C. Ionescu Tulcea, 149 pp, £6.70. Van Nostrand Reinhold Co Ltd (CW), Molly Millars Lane, Wokingham, Berks.

Whether the chips are down — whether silicon or plastic — the odds are on trouble. The chances that a player will throw a highly regarded seven or eleven are about equal to the betting on the site engineer: that he will turn up, be able to identify the faulty microchip component and have suitable replacement units on hand.

As this book makes clear, those who have an appreciation of the law of probabilities, have a head start on the rest of us.

Presumably, it was this aspect of system dependability which attracted the attention of the Computer Weekly book review editor?

A considerable part of the book is devoted to what is called "gambler's ruin formula". DPMs, of

course, know the formula well. It normally operates during peak work loads when the ops manager ignores the advice of the site engineer and takes a chance that the kit will stay up and running.

Other notable DP risk areas include running a new program without having the respective analyst on hand; running an application without adequate back-up security or hoping that the depleted stock of continuous stationary will last out. Such DP enterprisers would get short odds by the author.

No book on chips would be complete without a section on cheats. Casino craps is no exception and much data is presented on the topic.

Unfortunately, the book omits any reference to bluffing. This could well be tough luck on the DP professional who could do with some practical help!

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# The IBM display for non-IBM computers.

IBM have just produced a new VDU that will connect to most computers. Because it's ASCII Teletype compatible.

The first thing you'll note about it is the startlingly crisp definition of its screen.

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## First in series for DP chiefs

### Provides logical help

Computer and microprocessors made simple, by Ian Burdett and George Olsen, 239 pp, £2.50. W. H. Allen & Co Ltd (CW), 44 Hill Street, London, W1X 8LB.

The DP industry is well aware that behind the laboratory doors of university and industry research organisations, high level computer technology is developed. At the same time, considerable attention is being given by countless students to the study of Boolean equations, differential coefficients and exponential growth paths.

For all those involved in such areas as well as those whose misfortune it is to have to grapple with basic primer questions, the latest 'Made Simple' book could well provide logical assistance.

In fact for anyone contemplating building their own micro, this book would be a considerable benefit. But beware — by no means does the book attempt to live up to its title.

By page eight, we are already plunged into the not-so-simple world of hybrid computers and mathematics according to the level of pl.

"Computers and Microprocessors," then, is addressed to the research student, particularly those with the BCS, City & Guilds and BEC/TEC examinations in mind.

The book is of considerable interest and benefit. It is well structured and clearly illustrated and certainly must be one of the best value-for-money books around.

## For students of DP and accounts

Computer peripherals, by Barry Wilkinson and David Horrocks, 310 pp, £6.75 (paper). Hodder & Stoughton (CW), PO Box 702, Dunton Green, Sevenoaks, TN13 2YD. Tel: 0732 50111.

Integrating the computer with your business — accounting for computer charges, by James Porter and Jonathan Chapelle. Edited by Ron Yearsley. 308 pp, £9.50 (paper).

HFL (Publishers) Ltd (CW), 9 Bow Street, London, WC2E 7AL. Tel: 01-836 9081.

It appears to be fashionable in the current computer publication world to seek safety in numbers. Published recently are two books, both featuring academic co-authors.

"Computer Peripherals", as is the case with most technical books, loses little time in plunging the reader into the deep end. By Chapter Two, we are grappling with 20 milliamp current loops, digital to analogue converters, analogue to digital converters, multiplexers and multiple analogue channels, and complete analogue systems.

### Bubbles

As can be expected, bubbles feature strongly. Apart from basic bubble memories, the book covers bubble creation, bubble detection, and bubble domains.

For those perhaps more anxious to discover if Storage Technology has the edge on Memorex in the field of charge coupled devices, or BASF a more competitive price structure than IBM, the book offers no helpful guidelines.

Where the book does score is in the presentation of peripheral technology, whether involving the basic line printer or the oft-promised voice response system.

For such an up-to-date and well produced book, the list of references is surprisingly sparse and dated.

Timescales are likewise confused in the other paperback "Integrating the computer with your business". Despite a publication date of September 1980, the authors, in a final chapter suggest that among the round-the-corner developments are database systems, minis and micros and the associated office reworking. Coming over the horizon is remote entry by users.

Management by objectives is strongly featured but, if one objective is the complete mess of this book, then the manager will have little time available to implement his decisions.

The book is notably short on giving advice on how the DPM should react to crises. The section devoted to "vapour barriers" may well appeal to the local IBM engineering team but the local DPM could well appreciate some practical hints on how to deal with determined salesmen, managing director or shift leaders.

The publishers suggest that the book will be updated annually in which case the opportunity might well be taken to eliminate such basic English corruptions as "floorplanning", "people relocation", "conceptual steps" and "resource availability". Also the suggestion of an index next time round would be helpful.

There is, however, little doubt that the book could assist DPMs and accountants, especially BCS exam entrants. In particular the comprehensive analysis would be of considerable help.

Both books can be recommended — particularly for the students of computing, accounting and peripherals.

The well produced "Computer Peripherals" cost £6.75. More in keeping with the accountancy world is the Porter and Chapelle work at £9.50. As ever, the accountants have the power, the

Advances in data processing management, by Alan Rullo, 202 pp, £14.50. Hyde & Sons Ltd (CW), Speckle House, Hillview Garden, London NW4 2JQ.

ANY book which advises a reader to organise the computer room so as to leave room for circulation and then plunges deep into the abstract world of algebraic decision trees, is hard to define.

Unfortunately, sorting out the practical wood from the sheer trees is one of the major hurdles of the book. The format does follows contemporary popular styles of having one editor and dozen or so contributors.

As is only too common in such combined enterprises, the contents and structure reflect a random approach.

The book also follows the accepted practice of having reflected the contributions from its academic DP world.

It certainly seems to be the case that practising DPMs seldom have the ability or time to write up anything more dramatic than a checklist for a new project or operating guidelines.

If they did, the subsequent publication would surely concern less on statistical decision theory and assessment of probability structures, in favour of cost/benefit evaluation of practical delivery dates.

### First in series

The book is the first to be published in what is to be a series of Advances in DPP management, covering database, programmed distributed processing, communications and security.

The DPM management volume certainly aims to please, covering such computing basics as shared alternatives, user involvement, resource management and software packages.

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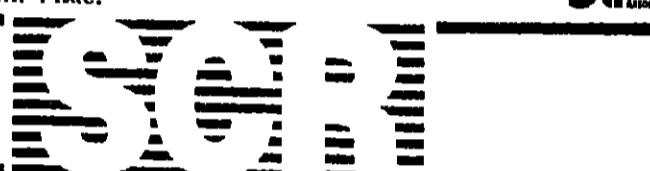
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Contract or permanent. Six month's assignment at our client developing comprehensive on-line systems. Experience of writing instructional and procedural documents and ability to communicate with staff at all levels is essential.

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Knowledge of COBOL and large DBMS systems is desirable. Telephone for an application form, quoting reference number 64, to Gordon G. T. Townsend International Limited, International Resource Consultants, Finsbury House, 30 Gresham Street, London, EC2V 7RR, 01-222 1077. (3456)

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Applicants should have at least 4 years IBM COBOL programming experience preferably using DOS combined with the ability to lead a team. A knowledge of CICS and/or DL would be an advantage.

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Familiarity with more than one manufacturer's products, sufficient systems analysis experience to appreciate user requirements, and the ability to assimilate new technical information rapidly are essential for this post.

Personality, communications skills and a flexible attitude are of equal importance. The consultant must be able to liaise with manufacturers, suppliers, users and all levels of management.

If you feel that your skills would be more fully utilised in this role than in your present position, then please contact us for an initial discussion.

Remember - breadth of experience is of more importance than any specialisation.

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### UNIVERSITY OF LONDON COMPUTER CENTRE

### COMMUNICATIONS SYSTEMS

The University of London Computer Centre provides a National Computer Service to Universities throughout Southern England. The Centre is equipped with Control Data 7600, 6600, 8400 and Cyber 72 computers and supports an extensive communications network of remote batch and interactive terminals. As the first stage of a development programme leading to the installation of an extremely high-speed processor and a bulk file store, a powerful new general-purpose support processor is to be installed during 1981.

A new front-end system is under development, which will support a common user interface both to the existing machines and to the new processor. This system will also provide gateway facilities to PSS and other national networks in order to allow ULCC users to access the facilities of other computing centres and to make the computational resources at ULCC available nationally.

The system is based on a hierarchy of processors from microprocessors to powerful mini-computers. Full use is being made of internationally agreed protocols such as HDLC, X.26, X.28, and the emerging standards for file and job transfer will also be adopted. Staff at the Centre have the opportunity to influence the development of these standards.

There are opportunities for both hardware and software designers and implementers to contribute to this major development in the front-end system itself and in the mainframe operating system interfaces to it.

Academic qualifications to degree level will be required. Experience of communications systems would be an advantage, but the main requirements are for an open and receptive mind and an enthusiastic and tenacious approach to tackling and solving problems.

Salaries will be according to age and experience in the range £4750 to £9500 per annum plus £987 London Weighting. The Centre offers excellent conditions of service and operates the University Superannuation Scheme.

Further details and application forms are available from Mr. N. Savage, Assistant Secretary, University of London Computer Centre, 20 Gifford Street, London, W.C.1. Telephone No.: 01-405 64000, Ext. 241.

Closing date for completed application forms 28th November, 1980.

(3450)

### PROGRAMMERS

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For this position applicants must have designed and implemented at least 1 major system. Experience of Technical as well as Commercial applications would be an advantage, though not essential. Must be able to supervise staff. Very good company using database management systems.

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Applicants must have evident management abilities and wide computing experience with particular emphasis on accounting and administration applications. In particular, the Arts Council is

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Further details, and application forms which must be returned by 24th November are available from: The Director, User Services, Oxford University Computing Service, 13 St. Barnard's Lane, Oxford OX2 8NN. Tel: Oxford (0865) 58721.

CEP/BMM  
23/10/80

(1453)

## Systems Analysts Analyst Programmers Mining Applications Western Australia

Australia's major iron ore company, Hamersley Iron Pty Limited, rates among the largest of the world's mining companies and operates two open pit iron ore mines at Tom Price and Paraburdoo in the Pilbara region of Western Australia. The mines are linked to the shipping port of Dampier by some 370 km of rail track, with a total mining capacity of 75 million tonnes of material annually to produce up to 48 million tonnes of iron ore for world markets.

Our towns, which are situated approximately 1000 km north of Perth, the capital city, are very modern and amongst the most picturesque in Western Australia. Our total workforce exceeds 4,000.

Because of a dramatic upsurge in general mining activity throughout Australia we are now looking for additional DP professionals to work in small teams on the development of site based applications, which are engineering orientated for production, maintenance and technical users.

The positions are based at Dampier, Tom Price and Paraburdoo and computing hardware consists of large HP3000s at each site.

Associated benefits are excellent and include first-class contributory superannuation fund, generous removal expenses for family and effects to Australia and on to place of appointment, air fares to Perth for family on leave, 5 weeks' annual leave, pro-rata long service leave of 6 weeks after 5 years' service.

Applications are database orientated and IMAGE/QUERY and VIEW are used extensively for database and screen handling. FORTRAN is the major language used. Installation of DS/3000 to link the computers in a network is underway and mine planning and geological applications

are being developed using state-of-the-art interactive graphics equipment.

Hamersley's commercial systems run on an IBM mainframe in Perth with an SNA network providing access from the Pilbara sites.

Applicants should have a strong FORTRAN background, be familiar with database and be capable of working with a minimum of supervision. HP3000 experience and/or interactive graphics experience is desirable but not essential.

Our salaries are very attractive. In addition, a 20% site allowance is paid at our northern towns where a lower rate of taxation is paid. Housing is modern, brick veneer, fully furnished and air-conditioned. Rental is very reasonable and electricity charges are minimal. For single personnel accommodation is provided in single, air-conditioned comfortable rooms and the charge, including good meals, is very reasonable. A very wide range of recreational and community facilities is provided including colour TV, hotel/motel and golf, hospitals, secondary and primary schools.

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are being developed using state-of-the-art interactive graphics equipment.

Hamersley's commercial systems run on an IBM mainframe in Perth with an SNA network providing access from the Pilbara sites.

Applicants should have a strong FORTRAN background, be familiar with database and be capable of working with a minimum of supervision. HP3000 experience and/or interactive graphics experience is desirable but not essential.

Our salaries are very attractive. In addition, a 20% site allowance is paid at our northern towns where a lower rate of taxation is paid. Housing is modern, brick veneer, fully furnished and air-conditioned. Rental is very reasonable and electricity charges are minimal. For single personnel accommodation is provided in single, air-conditioned comfortable rooms and the charge, including good meals, is very reasonable. A very wide range of recreational and community facilities is provided including colour TV, hotel/motel and golf, hospitals, secondary and primary schools.

The positions are based at Dampier, Tom Price and Paraburdoo and computing hardware consists of large HP3000s at each site.

Associated benefits are excellent and include first-class contributory superannuation fund, generous removal expenses for family and effects to Australia and on to place of appointment, air fares to Perth for family on leave, 5 weeks' annual leave, pro-rata long service leave of 6 weeks after 5 years' service.

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are being developed using state-of-the-art interactive graphics equipment.

</div

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Examine your Career to date and ask yourself a few questions.  
 What encouragement do you get to go to the top?  
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 Have you got a permanent and progressive Career?  
 Do you really have job security?  
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**DO YOU HAVE IBM OS or DOS EXPERIENCE?**

**EARN UP TO £10,000 in the UK.**

**DO YOU HAVE ICL, VME/B COBOL EXPERIENCE?**

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# AIM HIGHER-JOIN MARCOL

**For further information please contact:**

**Penny Bailey**

**Marcol Computer Services Ltd**

**60 Queen's Gardens**

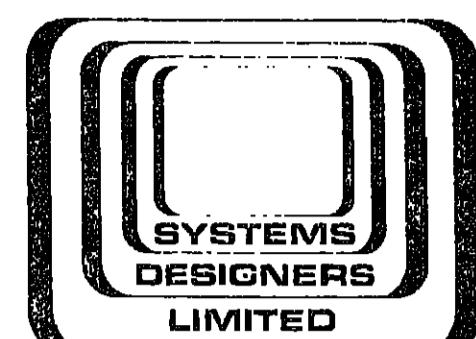
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**Real-time languages      Language environments**  
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Languages and techniques being developed and employed within the Division include:

Ada · PASCAL · CORAL 66 · PSL/PSA · MASCOT · UNIX

**CONSULTANTS · SOFTWARE ENGINEERS**

**PROGRAMMERS · GRADUATES**

Salaries to £14,500 with usual benefits

The Advanced Software Division of Systems Designers Limited needs experienced people to join research and product development teams working on real-time language projects. Products developed within the division include the Portable CORAL 66 Compiler and the CONTEXT Microprocessor Development System. The range of these products is being extended to include the new generation of mini and micro computers.

Many of the Division's current projects will have a significant impact on software technology over the next few years. Such projects include a new real-time program development system, an active research interest in embedded multicomputer systems and the design and implementation of Ada compilers and programming tools.

The Division uses its own mini and micro computer development systems to support software product development. Currently installed machines include two PDP 11/34's and a TI990/10, and a VAX 11/780 is to be installed for a major new language product to be developed over the next two years.

Systems Designers Limited is a British computer systems consultancy specialising in mini and micro-based systems for the highly demanding Defence and Industrial real-time fields, and also in exciting new developments such as Ada. In 11 years the company has grown to 240 professional staff whilst retaining its independence and individual management style. The Company is expanding steadily in the UK and has recently won a number of contracts in Europe and the United States.

If you have a good academic background, relevant proven experience, and are equal to the challenge, we would like to hear from you.

For an application form and Company brochure, telephone Sue Watts, asking the operator for Freephone 3179 or write to Sue Watts at:  
**Systems Designers Limited**  
**Systems House, 1, Pembroke Broadway,**  
**Camberley, Surrey GU15 3XH**

## Head of Software and Programming

**Kingston, Surrey** c. £9,500

This well-established (over 100 years), international construction company has a communications network of some 20 terminals with several commercial on-line systems up and running. Other on-line systems are under development and more are planned.

The Head of Software and Programming will work closely with the DPM and other senior managers within the company, (including Directors) on the analytical side and must have sufficient experience to contribute relevant ideas of his/her own. Another area of responsibility is liaison with manufacturers about hardware, operating systems and associated software.

Our client is looking for someone with at least 5 years experience (including a good knowledge of COBOL), who has taken at least one project through to completion and who has the ability to supervise a team of analyst/programmers and programmers.

Please quote ref: CW160-A

**CAPP ASSOCIATES** 01-686 9693

Computer and Professional Personnel Consultants  
AMP House, Dingwall Road, CROYDON CR9 9XA

**THORBAR**

Greenock House 19 Cuckfield Road Hurstpierpoint Sussex BN6 9RF

Telephone: Hurstpierpoint (0273) 833848

## CENTRAL LONDON

### EUROPEAN M.I.S. MANAGER OPPORTUNITY FOR TRAVEL IN EUROPE AND TO THE U.S.A.

Our clients are Commodity Brokers working on a worldwide basis in the Metal and Soft Commodity Industries. The decision has been made to appoint an M.I.S. Manager who will report direct to the group's headquarters in Chicago and will be responsible for developing all European DP facilities supporting branch offices in London, Hamburg, Amsterdam, Zurich and Geneva. If you can portray experience in line with all or some of the following requirements we would like to discuss this highly attractive opportunity with you:

1. A minimum of 5 years' experience in DP with a sound COBOL programming and systems design background.
2. Specific experience gained from working in an environment using mini computers and/or terminal hardware desirable.
3. Your mainframe experience is likely to relate to an IBM background.
4. A high level of academic achievement is sought supported preferably by a degree.

This position calls for a person able to accept a high degree of responsibility with the necessary self motivation, and to work well with all levels of user management in Europe and the USA. You will be expected to spend a number of weeks initially in Chicago familiarising yourself with the existing DP applications running on two 370/158s under OS/MVS.

Ring us now to arrange for an immediate appointment

## Analyst/Programmers

New ME 29 Installation + T.P. and Database

**Croydon**

**Salary to c. £10,000+**  
**Mortgage Subsidy + Other Benefits**

A new ICL ME 29 installation, in the Croydon area, needs two more Analyst/Programmers to work on completely new development projects. The company is part of a large international group and specialises in the General Insurance area. The installation will use TPS to control an in-house and remote terminal network, and IDMS database.

Terms of employment are excellent. An extremely attractive basic salary (to £10,000 according to experience), a mortgage subsidy (down to 9%), very good pension and protective insurance schemes, flexitime, and normal other benefits.

What do we want from you? At least 3 years experience as a COBOL Programmer, with involvement in systems analysis and design - you will have total responsibility for your own system. Some T.P. experience would be a major advantage. Other relevant experience could include working in an insurance environment, with mini computers, small ICL hardware and database.

Please telephone immediately for a discussion quoting ref: CW 159-J. We intend to conduct final client interviews between 6th and 12th November.

**datascene**

## SENIOR PROGRAMMERS

**E. LONDON** to £8,000

Our clients are recognised leaders in the leisure industry who are looking for Senior Programmers for their IBM installation. The situation is on the East London-Essex borders. The computers are 370s with 4341s on order.

Applicants should have around 4 years' experience of COBOL on IBM equipment and ideally will have CICS experience.

In addition to the salary the company offers a Christmas bonus, paid overtime, 5 weeks' annual leave and a staff shop.

D.4716

## RPG II PROGRAMMERS

**LONDON CITY** to £8,000

A well established software house specialising in insurance and banking systems are recruiting RPGII Programmers. You should have at least 18 months' experience preferably with IBM hardware and gained ideally within a financial environment. Client contact is expected and applicants will be dealing with management at all levels. These positions offer excellent scope for capable programmers who wish to enhance their careers by utilising the latest IBM software and In-house developed database systems.

M.4724

**BASIC + / BASIC + 2** to £8,000

**VARIOUS LOCATIONS** to £8,000

We are continuously hearing of new vacancies for programmers and analysts/programmers in BASIC, BASIC+, BASIC+2 or AIMS. Experience ranging from JUNIOR to SENIOR LEVELS could open opportunities in BANKING, INSURANCE, LEISURE or SOFTWARE HOUSES located in ESSEX, THE CITY, BERKS, SAUDI ARABIA and HANTS. Experience with DEC, PDP or SYNTIME equipment would be particularly relevant especially if combined with FINANCIAL or ENGINEERING background.

R.GEN

## ICL PROGRAMMERS

**ESSEX** to £8,500

Our clients are manufacturers of quality home products who are situated on the Essex/Herts borders. The location is accessible from both East Anglia and London.

They seek COBOL Programmers with a minimum of 2 years' experience gained preferably on commercial applications. Chances exist for progression into Analysis. In return they offer a good salary, 4-5 weeks' annual leave paid at time and a half, subsidised company products and a bonus of up to 8%.

D.4612

## RPG II ANALYST

**LONDON CITY, IBM SYS 32, 34, 38** to £10,000

An excellent opportunity has arisen for experienced Analyst Programmers to progress into consultancy. Ideally you will have at least three years' IBM RPGII experience, one of which should involve systems work. Applications will revolve around banking and insurance projects and will include database, communications, and financial planning and modelling. Applicants must be of smart appearance and have been educated to A level standard. An excellent benefit package is offered and futuristically will include a car.

M.4726

## PROJECT LEADER

**SURREY** to £12,000

Our client is the computer division of a well-known group of companies, who have recently expanded their processing power very significantly, to cater for a heavy systems development plan. The company require an experienced PROJECT LEADER with in depth knowledge of PAYROLL systems to complement their friendly systems development department. A minimum of six years' experience at a senior level working in COBOL will be needed by the successful applicant.

R.4770

## JUNIOR ANALYST

**S. W. ESSEX** to £7,500

An excellent opportunity has arisen for a very good programmer or Analyst/Programmer to make the transition into SYSTEMS ANALYSIS. Modern UNIVAC equipment is utilised in the department and a large data communications network has been established. A variety of batch and on-line systems are in operation and development is still taking place. In addition to the salary, a bonus of approx. 8% is paid.

R.4676

## PROGRAMMERS & ANALYSTS

**SURREY ICL 2900 COBOL** to £9,000

Our client is a well-established insurance company, situated within easy reach of Surrey, Sussex and London, who seek to extend their D.P. staff in the New Year. They require COBOL programmers with at least one year's experience and analysis with not less than two years. In all cases a knowledge of the 2800 range is expected.

D.4654

In return they offer a good pension scheme, a mortgage and a relocation package.

The above vacancies are only a small selection from those currently on our files and we are always delighted to talk to experienced systems and programming staff wishing to further their careers.

(300)

Datascene International Limited,  
Scopse House,  
169-173 Regent Street,  
London W1R 7FB. Telex: 28851.

01-439 7871  
24 hour answer phone

**JBA**

## Field Service Engineers

**Saudi Arabia** up to £15,000 tax free plus allowances.

Our client is a well-established commercial organisation with many diverse interests, who are appointing two customer engineers to join a newly formed support group based in Jeddah.

Candidates must have at least 2 years' experience of servicing IBM processors and peripherals. A recognised qualification and/or knowledge of software would be an advantage.

A very attractive package on permanent named status.

Contact: Jim Baker

## Consultant Information Retrieval Systems

**London** to £10,500 + profit share

This is a unique opportunity for an experienced computer information retrieval specialist to join one of the UK's foremost service organisations.

The company wish to appoint a consultant with a computer background but who has been responsible for the implementation of a system in library, information or document management centre. Candidates should have some knowledge of at least one proprietary package in the field, such as STAIRS, STATUS, DIALOG, ASSASSIN or ORBIT.

Applicants will be expected to have the personality and communication skills to carry out client projects with detailed supervision. They should also be able to contribute to the continuing development and marketing of packages and services in this area.

Excellent opportunity to progress in an interesting and professional environment.

Contact: Margaret Stevens

## CICS & DL/1 Programmers

**London** £10,500 + Mortgage

Join a highly professional group of data processing specialists, whose main activity is to finalise the functional specifications for a new International Banking System. Development will be undertaken by a number of teams including one specialising in all technical support areas and systems programming capabilities.

The organisation is seeking various levels of expertise, but to apply a minimum of three years' sound commercial experience of COBOL and CICS from a large IBM environment is essential. Knowledge of DL/1 and IBM 4300 series would be a definite advantage.

Responsibilities and financial reward will depend on the level of experience of each individual. Opportunities to learn new techniques are coupled with good salaries and an excellent benefits package.

Contact: Janet Chivers

## Senior Systems Analyst

**c. £10,500+**

A large, well known organisation operating on an International basis require additional expertise in their systems development area.

It is essential to have a minimum of five years' experience in an IBM COBOL environment and candidates should have some knowledge and practical experience of financial applications and on-line systems. The ability to communicate effectively is of prime importance.

This is an excellent opportunity to progress in a challenging and professional environment.

Contact: Isobel Bruce

## Data Processing Manager

**South London** c. £10,500

We have been retained by a large international organisation who are component makers to the European industry, to recruit a Data Processing Manager to take responsibility for their UNIVAC 90/30 site.

Candidates must have at least five years' experience in D.P. having gained extensive knowledge of RPGII and some form of database.

This knowledge coupled with exposure to an ASSEMBLER language and a basic appreciation of communications is essential. Successful applicants will be expected to undertake some form of analysis, be mature enough to handle the budgeting of the department and be able to show a flair for management and have the ability to delegate.

Contact: David Hendry

## HP3000 Software Specialist

**neg. to £10,000**

SCICON has an unsurpassed reputation for its technical ability and expertise in the development of advanced systems and software. To meet the demand for efficient and versatile systems they now require an experienced Hewlett Packard software technician to provide system support to the development teams. Responsibilities will also include the management of in-house machines. To qualify for this position candidates will have at least 2 years' practical experience of HP3000 and have an in-depth knowledge of the Internals of MPE, IMAGE and QUERY. An appreciation of the hardware structure and the ability to configure systems would be desirable assets.

An excellent opportunity to progress in a challenging and professional environment.

Contact: Margaret Stevens

## Analyst/Programmers

**Jersey - Three year assignment.** to £9,300

Due to considerable systems development over a long term plan our Client wishes to strengthen their project teams with experienced Analyst/Programmers to cover a 3 year period.

Successful applicants will be assigned to specific application areas, covering initially financial systems as well as assuming an instructive role for junior team members.

Ideal qualities would be 3 years COBOL on ICL 2904 or similar; a strong analysis background and possibly exposure to structured programming techniques. Experience of mini computers would be an added advantage.

Single status preferred, though married applicants without children will be equally considered.

Contact: Brian Postles

## Programmer

**c. £6,500**

A well established international organisation has a vacancy for a Programmer to join its team developing commercial applications.

The company currently operates an ICL 1900 but is expecting to up-grade the installation next year.

Applicants should have at least eighteen months experience of COBOL, preferably on ICL equipment and be enthusiastic to develop real-time, on-line and database systems.

This is an ideal opportunity to work in a professional environment and learn new techniques.

Contact: Jim Baker

## JAMES BAKER ASSOCIATES

**International Personnel Consultants,**

**32 Savile Row, London W1.**

**Tel: 01-439 9311.**

# COMPUTER ENGINEERS

Advance and be recognised!

- £15K+ Snr. engineers with in-depth component level knowledge to work on large M/F equipment. Degree or HNC preferred.
- £12K+ IBM 370 engineers to work in S. Wales/Bristol area. CPU or peripheral experience.
- £10K+ Snr. engineer with DEC 11 background for project and technical support.
- £8K+ Mini engineers for London and West areas, dynamic expanding company.
- £7K+ Instructor/technical support for peripheral manufacturer - Reading area.
- £5K+ Young engineer to train on micro systems based in Central London.
- £5K+ Terminal engineer for Sussex/Surrey, no previous computer experience required.
- Overseas** Technical Managers required for 3 different clients all supporting mini systems within the Middle East.

Capp Associates specialise in computer engineers, and can help you find a position suited to your skills and experience. Our clients require personnel at all levels from junior engineers to UK service managers, so if YOU are looking for a step up, telephone or write to our Engineering Consultant - Phil Chapman.

**CAPP  
ASSOCIATES**

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AMP House, Dingwall Road,  
CROYDON CR9 9XA

## RN-SSK DIESEL-ELECTRIC SUBMARINE WEAPON SYSTEM

**NEW PROJECT : NEW OPPORTUNITIES**

### SOFTWARE DESIGN ENGINEERS

The advent of a new class of submarine for the Royal Navy brings with it fresh opportunities for a system approach to the proposed weapon fit. As a significant part of a multi-million pound contract Vickers Shipbuilding Group Ltd., Weapons Department have been designated CO-ORDINATION AND SYSTEM DESIGN AUTHORITY with responsibility for overall system design development and performance amongst other tasks.

As part of the newly-formed team SOFTWARE ENGINEERS are required with particular responsibilities in a REAL TIME MICROPROCESSOR-based system for:

1. Specification, design and implementation of software modules for submarine weapon guidance and target analysis systems using high and low level language.
2. Analysis of Mathematical and Statistical methods particularly those concerned with target tracking (e.g. digital filtering technique).
3. Assessment of overall system considerations concerned with the procurement of a total ship weapon system.

Experience of submarine operations would be desirable.

#### QUALIFICATIONS AND EXPERIENCE

Honours degree or equivalent in maths or applied science plus at least 3 years experience of Software design for Military and Industrial real-time systems.

The positions are open to both men and women.

Please write with details of age, qualifications and experience to:

Mr J. Richardson, Personnel Officer,  
Vickers Shipbuilding Group Limited,  
Barrow Shipbuilding Works, PO Box No. 8,  
Barrow-in-Furness, Cumbria, LA19 1AB

Vickers Shipbuilding Group Limited

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(218)

#### UNIVERSITY OF GLASGOW ADMINISTRATIVE DATA PROCESSING PROGRAMMER/ANALYST

Applications are invited from suitably qualified persons for the post of Programmer within the Administrative Data Processing Section of the University Registrar's Office. Data Processing primarily provides administrative data processing services to the Registry and Court Offices. All administrative systems are currently run on the University's ICL 2076 computer. It is planned that a local microprocessor system will be implemented to provide online processing for the Records and Examinations Office. The person appointed would be involved in both the maintenance of current systems and the new programming applications which are planned.

Applicants should hold a University degree or equivalent professional qualification. Preference will be given to those with experience of programming or analysis in a data processing environment. Salary will be on Grade 1A of the scale for Other Related Staff (£6505-£9395, under review), with a 10% placement dependent upon age, qualifications and experience.

Further particulars may be obtained from the Secretary of the University Court (Room 18), University of Glasgow G12 8QH, with whom applications (8 copies), giving the names and addresses of three referees, should be lodged on or before 21st November, 1980. In reply please quote Ref. No. 4781. (3498)

## The office of the future O&M or DP background, c £12,000

We are one of the largest firms of management consultants in the UK and have associates throughout the world. Our clients range in size from the largest public sector organisations to small private companies.

Our Office of the Future consulting group assists clients in the areas of:

- policy formation
- strategic and implementation planning
- applications identification and development
- equipment and systems selection.

The men or women we recruit to join this expanding group will be graduates aged 28-32, and have five years' experience in O&M or micro-systems. They will have had project responsibility in at least one of the areas of micro computing: word processing; telecommunications, fax and telex; or viewdata.

You will have the opportunity to work with colleagues who specialise in the fields of data processing, communications, business analysis, operations research, organisational development and accounting.

Please ring Ernest Morris or John Haywood on 01-806 4040; or send your cv to Edward Simpson, Ref. SCBO/30 at the address below.

#### Coopers & Lybrand associates

Coopers & Lybrand Associates Limited  
management consultants

Shelley House, Noble Street  
London EC2V 7DQ

#### UNIVERSITY OF SOUTHAMPTON PROGRAMMING STAFF

The University Computer Service is seeking additional programming staff to assist in the support and development of its Service. The Service provides extensive batch and interactive facilities based currently on three mainframe computers (ICL 170, a Honeywell 6080 and a VME 11/45, and uses facilities at London and Manchester Universities remotely. In addition to the support of mainframe services a microcomputer Development Service has been established and development work is currently carried out in the areas of communications, with an emphasis on campus networks, the rationalisation of facilities, data base usage and the development of user support techniques.

Applicants should possess a degree or equivalent, and have relevant experience (for certain posts an engineering background would also be an advantage).

The appointment will be in the salary range 1B or 1A: £4785-£5965 per annum. The starting salary will depend upon qualifications and experience.

Applications (2 copies), giving curriculum vitae, qualifications and experience and the names and addresses of two referees, should be sent to Mr. M. Vaughan-Smith, Staffing Department, The University, Southampton SO9 5NH, from whom further particulars may be obtained. In reply please quote Ref. No. 4785. (3497)

Applicants should possess a degree or equivalent, and have relevant experience (for certain posts an engineering background would also be an advantage).

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#### QUEEN MARY COLLEGE University of London PROGRAMMER

An experienced Programmer is required to assist research teams solving problems in fields involving communications, air power systems, and space systems. Applicants should have a knowledge of FORTRAN and ALGOL. The Programmer will have access to the QMC ICL 2076 and London University CDC 7600 computers. Opportunities to assist with programming of mini- and micro-computer systems, and graphics (under review) £8472-£10502 p.a., including London overtime. Please apply by letter giving full curriculum vitae and names of referees. Applications should be submitted to the Secretary, Queen Mary College, Mile End Road, London E1 4NS, not later than 21 November.

(3498)

#### THE UNIVERSITY OF GLASGOW DEPARTMENTS OF MECHANICAL ENGINEERING AND NAVAL ARCHITECTURE COMPUTING ASSISTANT

Applications are invited for the post of Computing Assistant. Minimum requirements are a Science Certificate, applicable minimum of Mathematics or Computer Studies with at least 2 years experience, and a reasonable combination of experience and qualifications.

Appointment will be made according to qualifications and experience. Salary range £3,339-£4,110.

Applications, including a current curriculum vitae and the names and addresses of two referees, should be sent to Professor J. D. Robinson, Department of Mechanical Engineering, University of Glasgow, Glasgow G12 8QQ before 17th November, 1980.

In reply please quote Ref. No. 4785. (3497)

#### WELSH NATIONAL SCHOOL OF MEDICINE UNIVERSITY OF WALES DENTAL SCHOOL RESEARCH OFFICER

Graduates in Engineering or Physics with a range of interests in computer programming are required in the Department of Restorative Dentistry for a project upon the measurement of residual tooth structure using the SRC initially for three years. The successful candidate will also have the opportunity to work with the Department of Medical Physics and the Department of Medical Statistics in the School of Medicine. Commencing salary £4,792.

Candidates who wish to discuss the post, should contact Dr. O. D. Bufford, Tel: 785944, Ext. 2818. Further particulars and application forms (quoting ref. no. DS15/80) to whom applications should be submitted as soon as possible.

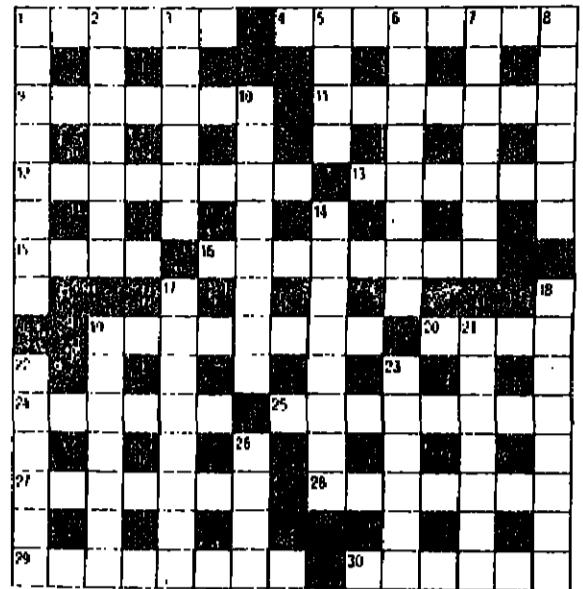
Compo and speak with us soon.

Tel: 01-734 9776

DATA PROCESSING, COMPUTER TRAINING, MANAGEMENT INFORMATION SYSTEMS

**CW Prize Crossword 10**

Compiled by Alec Robins  
A prize of £10 will be awarded for the first correct entry opened. The second and third solutions opened will receive £5 each. Entries to Crossword Competition, Computer Weekly, Dorset House, Stamford Street, London SE1 9LU, by first post Friday, November 14. Please use a ballpoint to complete the crossword.



Name..... (Miss, Mrs, Ms, Mr)

Address .....

Telephone .....

I accept the rules and conditions of the Computer Weekly Crossword Competition.

Signed..... Date.....

**ACROSS**

- Is taken in by arty female - ill-treatment results (6)
- Sick, obese editor is unlucky (3-5)
- Remedy that you have when your guitar's broken? (7)
- Spring up and declaim about right (7)
- Highlander's sword can disturb or calm ye (8)
- A brace left inside the two-seater car (6)
- One's not expected to win in a row with a stranger (4,8)
- Establishment of innocence - freed and gone off (6,2,4)
- Split a pound, making payment for a letter (6)
- Navy, for example, having a party with Her Majesty (8)
- Summary by judge, ultimately, must be scrupulously exact (7)
- It's enormous - isn't it an iceberg? Not all of it's visible (7)
- Small fist - grip back with an effort (4,2)
- A politician elected before the current measure (6)

**DOWN**

- Handy treatment provided by the healer's profession? (8)
- Support us, sunk in shame (7)
- Policemen turn up around the border, making pinch? (6)
- Oft rows erupt in the Upper House, yet is unable to speak (4,3,5)
- One gives a heavy beating for a whooping fit (7)
- The Governor, grabbing the girl, is frustrated (6)
- Plunderer, a rude drunk, after spoil (8)
- Having a sound correspondence with fool concerning worker (8)
- Dissolve rake tucking into 299 That's odd (8)
- Interval during play at recent clash (8)
- It's fashionable to obtain fish around the North (7)
- Imprisonment was speedy with Mussolini about (7)
- Come casually into conversation, with hunting-whip raised (4,2)
- Pants? That's usual, perhaps, when climbing steep hills (6,4)

**RULES AND CONDITIONS**  
1. Each competitor may submit no more than one entry.  
2. The competition is open to all readers of Computer Weekly with the exception of the staff of IPC Business Press Ltd, any printers employed by them, or the near relatives of any such staff.  
3. The solution of each puzzle will normally be published in

**AGE:** Between 17-22 years.

**QUALIFICATIONS:** 'O' Levels, and any operating/punching experience would be useful.

**JOB:** Trainee Computer Operator/Punch Operator.

**COMPUTER:** Honeywell 62/40 ECOS Operating System.

**BENEFITS:** LVs after 3 months! Staff loan scheme. Flexitime. Full training will be given.

**SALARY:** NEGOTIABLE depending upon age and experience.

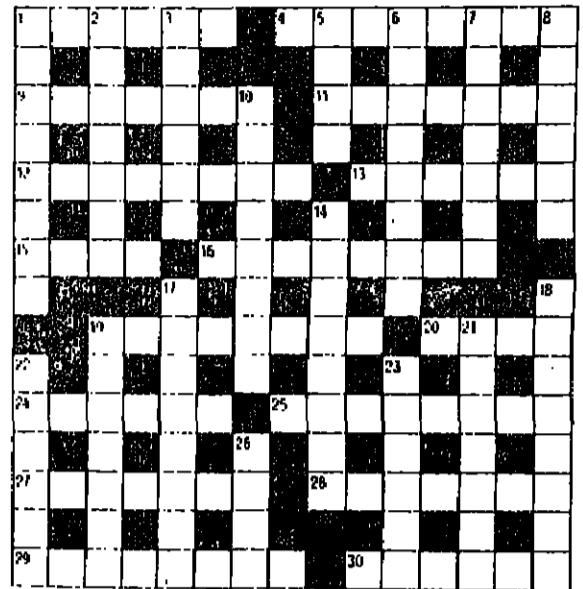
**SITUATED:** Fulham, S.W.6. Nearest Tube Station, Parsons Green, 10-minute walk.

**CONTACT:** Mr. N. Chatterton, 01-736 8262, Ext. 37

(1466)

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- A brace left inside the two-seater car (6)
- One's not expected to win in a row with a stranger (4,8)
- Establishment of innocence - freed and gone off (6,2,4)
- Split a pound, making payment for a letter (6)
- Navy, for example, having a party with Her Majesty (8)
- Summary by judge, ultimately, must be scrupulously exact (7)
- It's enormous - isn't it an iceberg? Not all of it's visible (7)
- Small fist - grip back with an effort (4,2)
- A politician elected before the current measure (6)

**DOWN**

- Handy treatment provided by the healer's profession? (8)
- Support us, sunk in shame (7)
- Policemen turn up around the border, making pinch? (6)
- Oft rows erupt in the Upper House, yet is unable to speak (4,3,5)
- One gives a heavy beating for a whooping fit (7)
- The Governor, grabbing the girl, is frustrated (6)
- Plunderer, a rude drunk, after spoil (8)
- Having a sound correspondence with fool concerning worker (8)
- Dissolve rake tucking into 299 That's odd (8)
- Interval during play at recent clash (8)
- It's fashionable to obtain fish around the North (7)
- Imprisonment was speedy with Mussolini about (7)
- Come casually into conversation, with hunting-whip raised (4,2)
- Pants? That's usual, perhaps, when climbing steep hills (6,4)

**RULES AND CONDITIONS**  
1. Each competitor may submit no more than one entry.  
2. The competition is open to all readers of Computer Weekly with the exception of the staff of IPC Business Press Ltd, any printers employed by them, or the near relatives of any such staff.  
3. The solution of each puzzle will normally be published in

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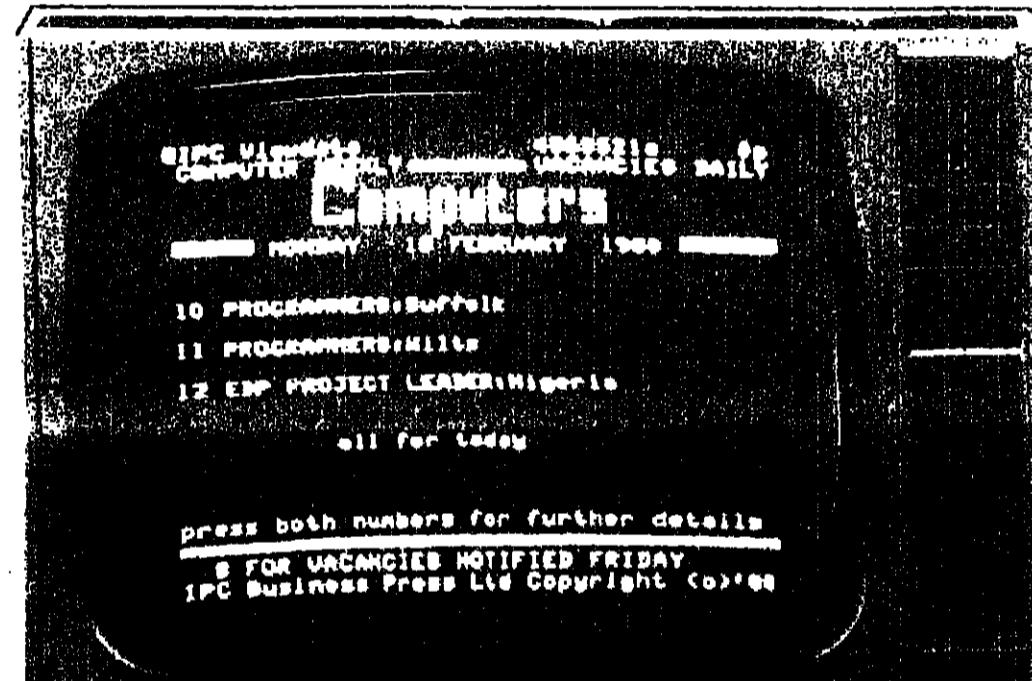
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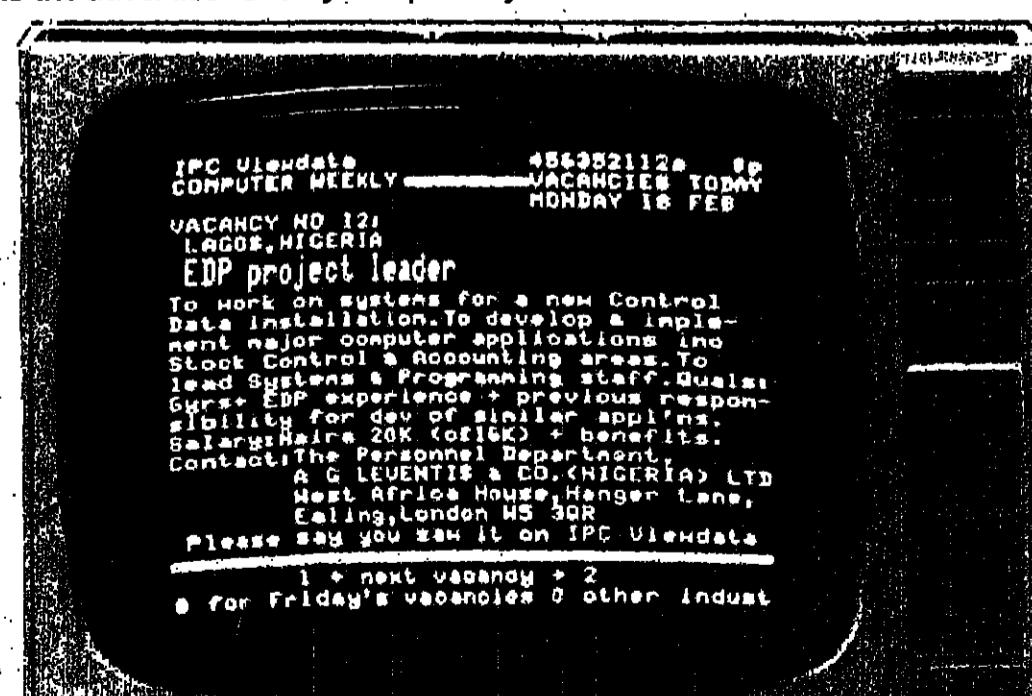
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